FIG. 1

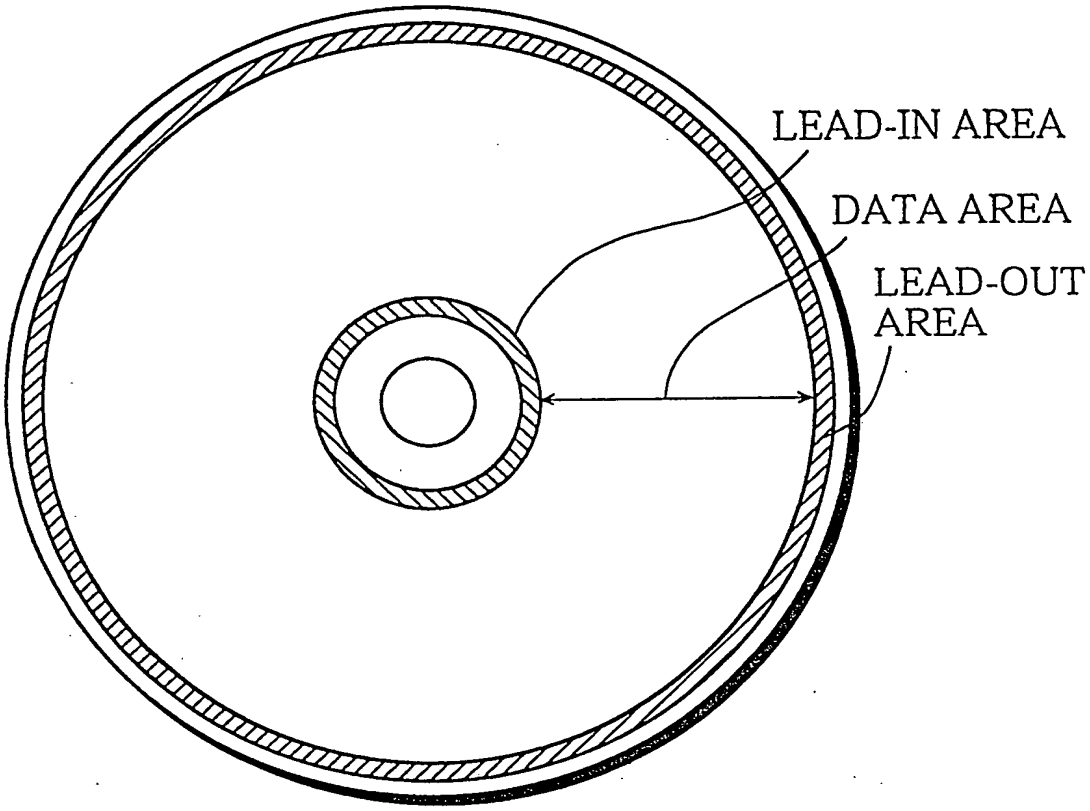


FIG. 2

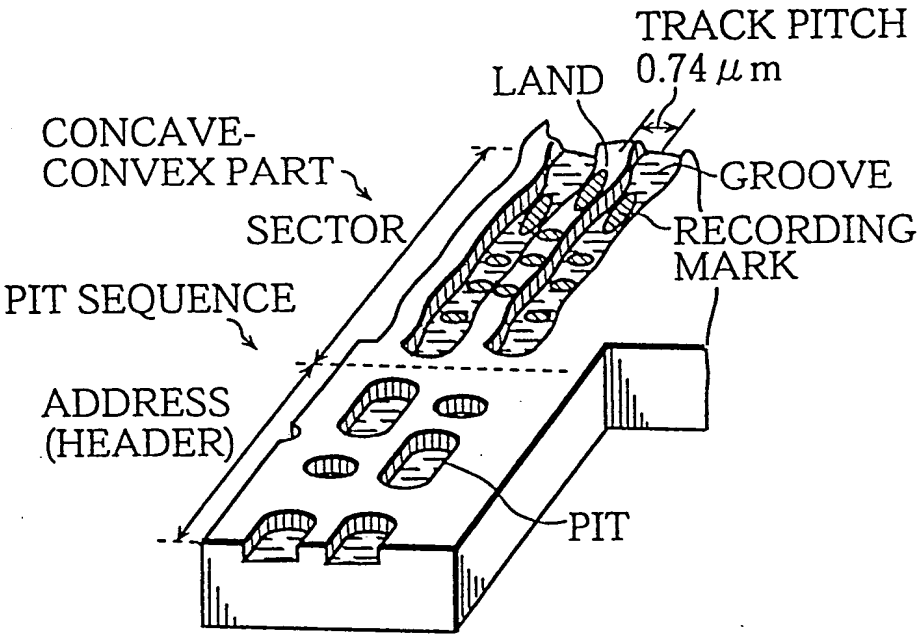

TRACK PITCH
0.74 μm
LAND
CONCAVE-
CONVEX PART
GROOVE
SECTOR
RECORDING
MARK
PIT SEQUENCE
ADDRESS
(HEADER)
PIT

FIG. 3A

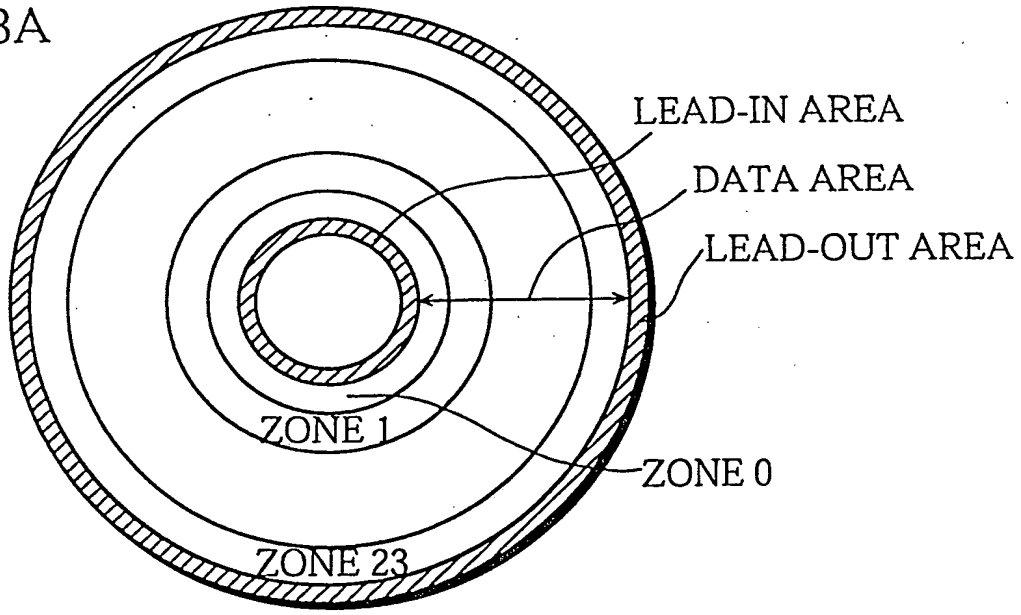


FIG. 3B

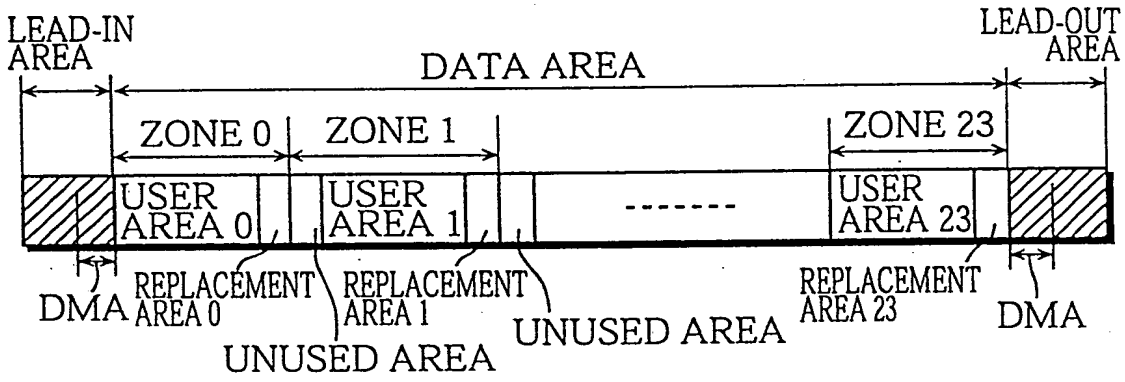


FIG. 3C

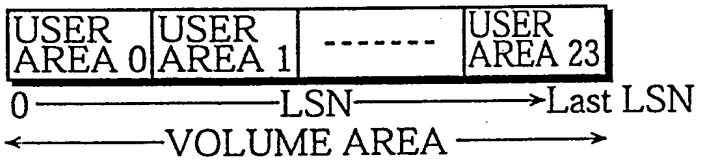


FIG. 3D

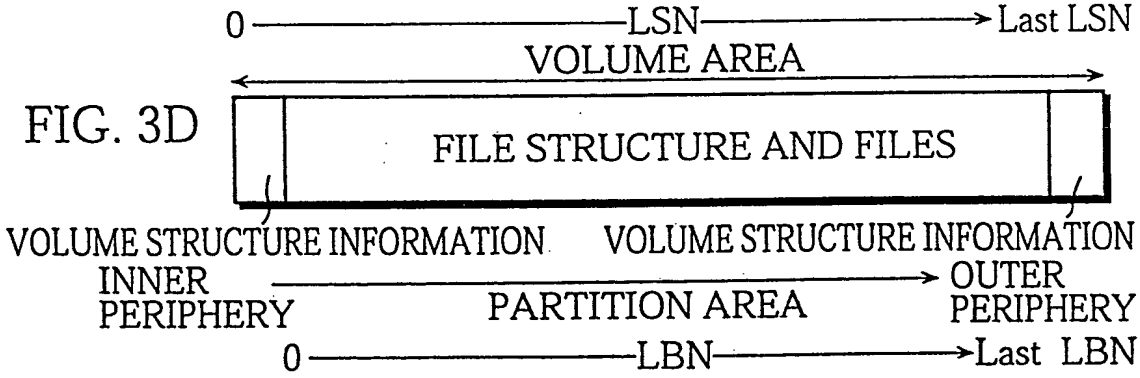


FIG. 4

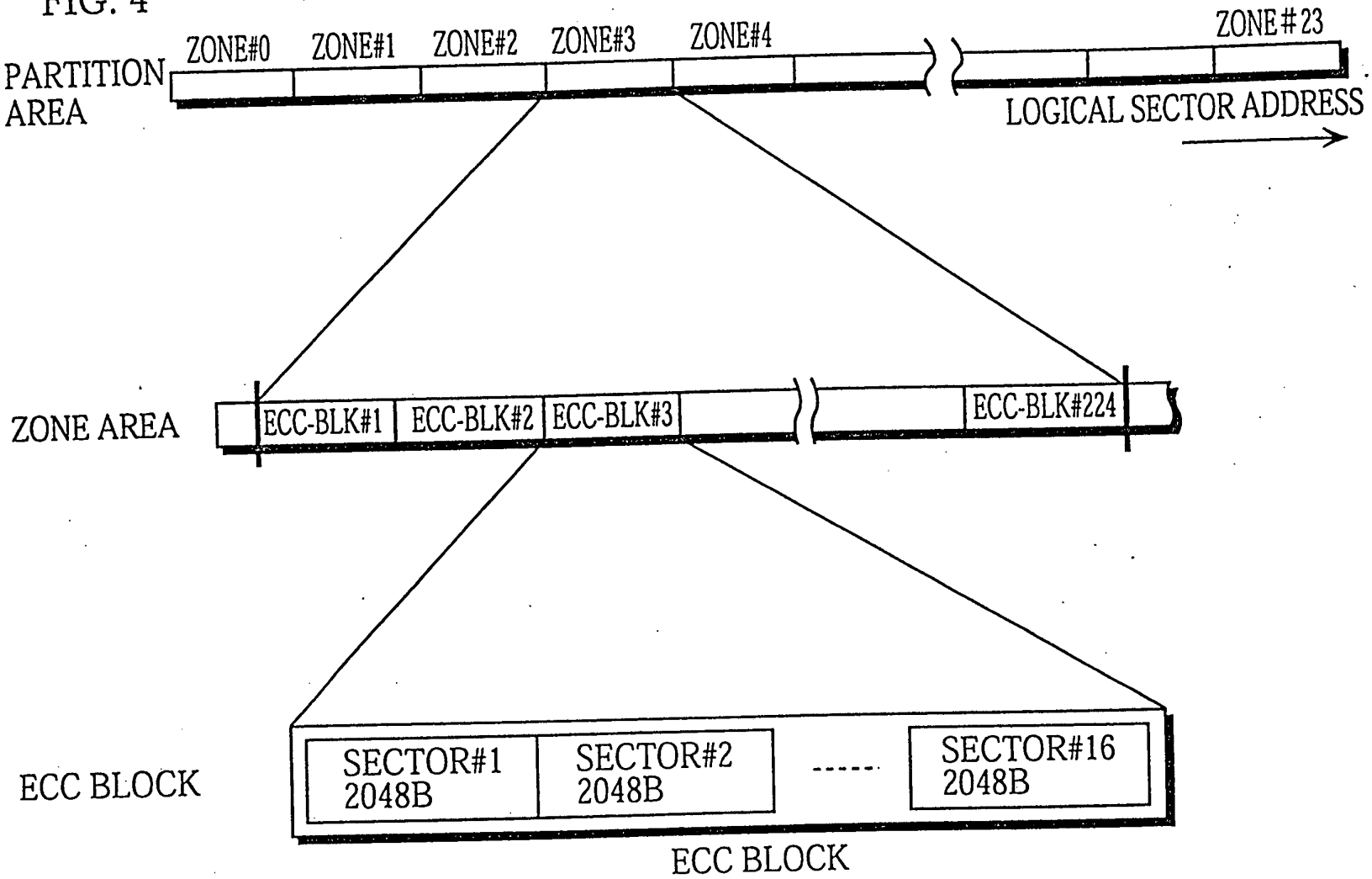

PARTITION AREA
ZONE#0
ZONE#1
ZONE#2
ZONE#3
ZONE#4
ZONE#23
LOGICAL SECTOR ADDRESS
ZONE AREA
ECC-BLK#1
ECC-BLK#2
ECC-BLK#3
ECC-BLK#224
ECC BLOCK
SECTOR#1 2048B
SECTOR#2 2048B
SECTOR#16 2048B
ECC BLOCK

FIG. 5

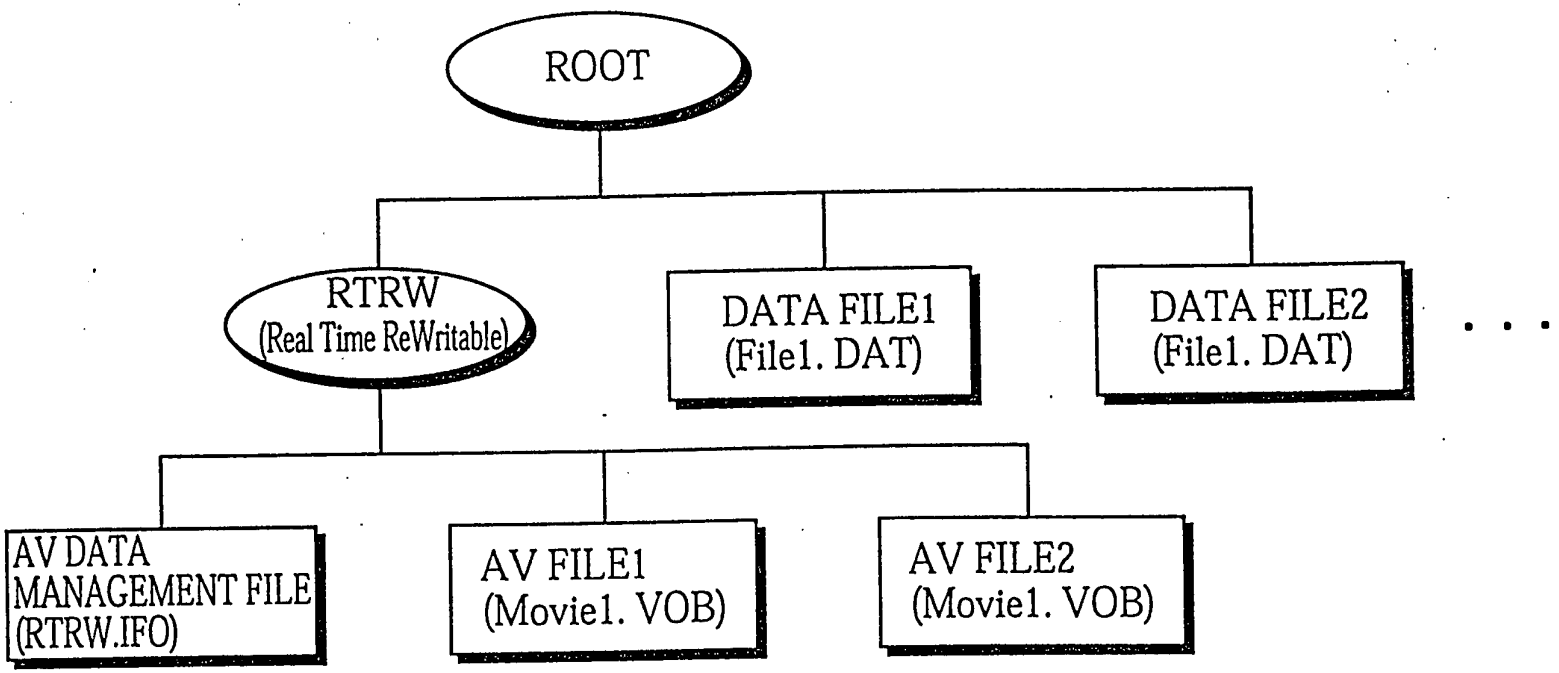

ROOT
RTRW
(Real Time ReWritable)
DATA FILE1
(File1. DAT)
DATA FILE2
(File1. DAT)
AV DATA
MANAGEMENT FILE
(RTRW.IFO)
AV FILE1
(Movie1. VOB)
AV FILE2
(Movie1. VOB)

FIG. 6A

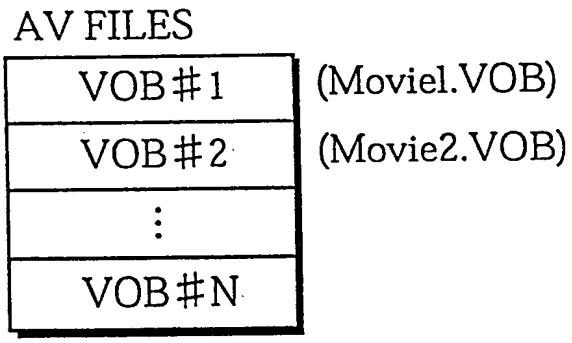


FIG. 6B

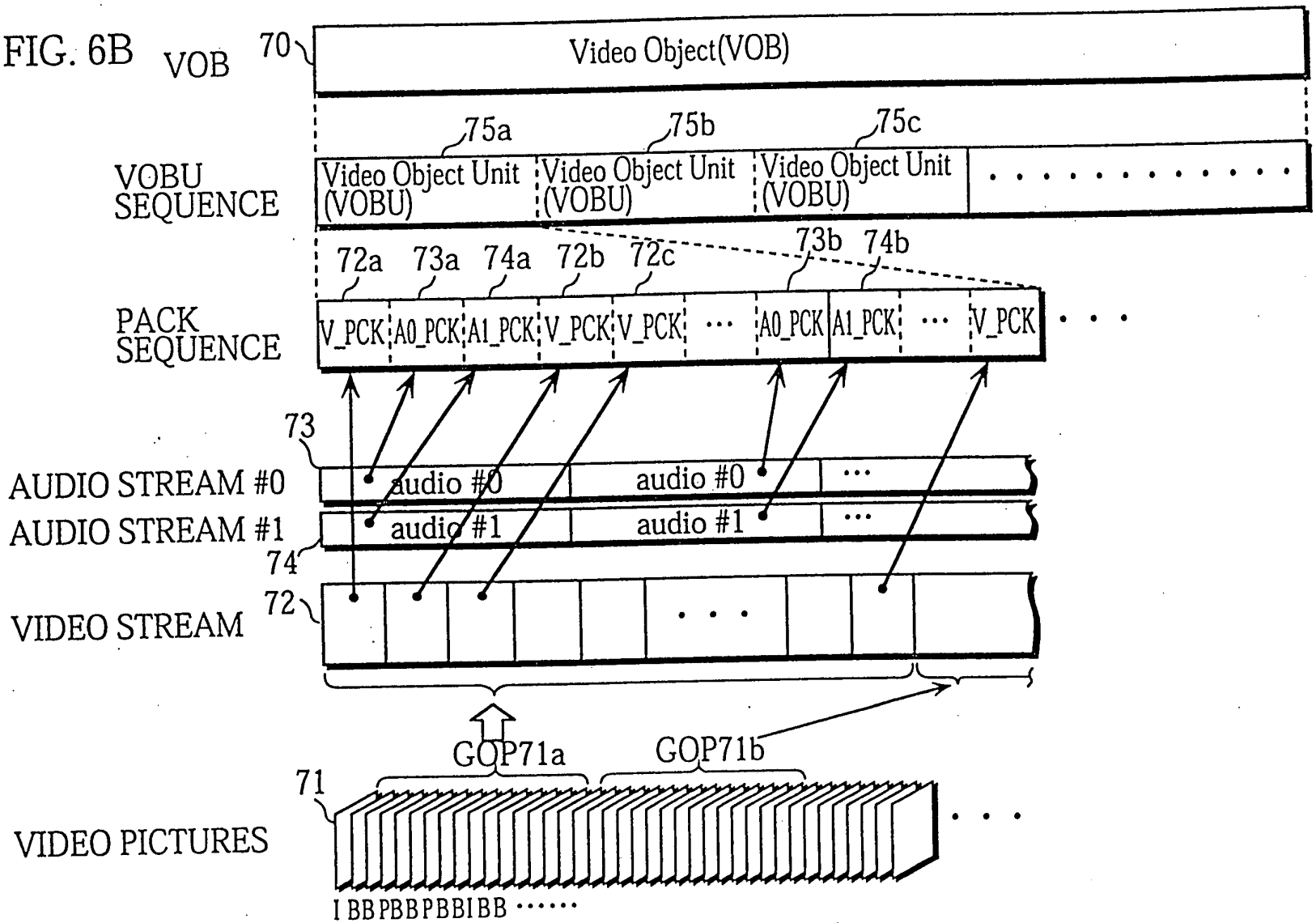

VOB
70
Video Object(VOB)
75a
75b
75c
VOBU SEQUENCE
Video Object Unit (VOBU)
Video Object Unit (VOBU)
Video Object Unit (VOBU)
72a
73a
74a
72b
72c
73b
74b
PACK SEQUENCE
V_PCK
A0_PCK
A1_PCK
V_PCK
V_PCK
A0_PCK
A1_PCK
V_PCK
73
AUDIO STREAM #0
audio #0
audio #0
AUDIO STREAM #1
audio #1
audio #1
74
72
VIDEO STREAM
GOP71a
GOP71b
71
VIDEO PICTURES
I BB PBB PBB PBB I BB

FIG. 7

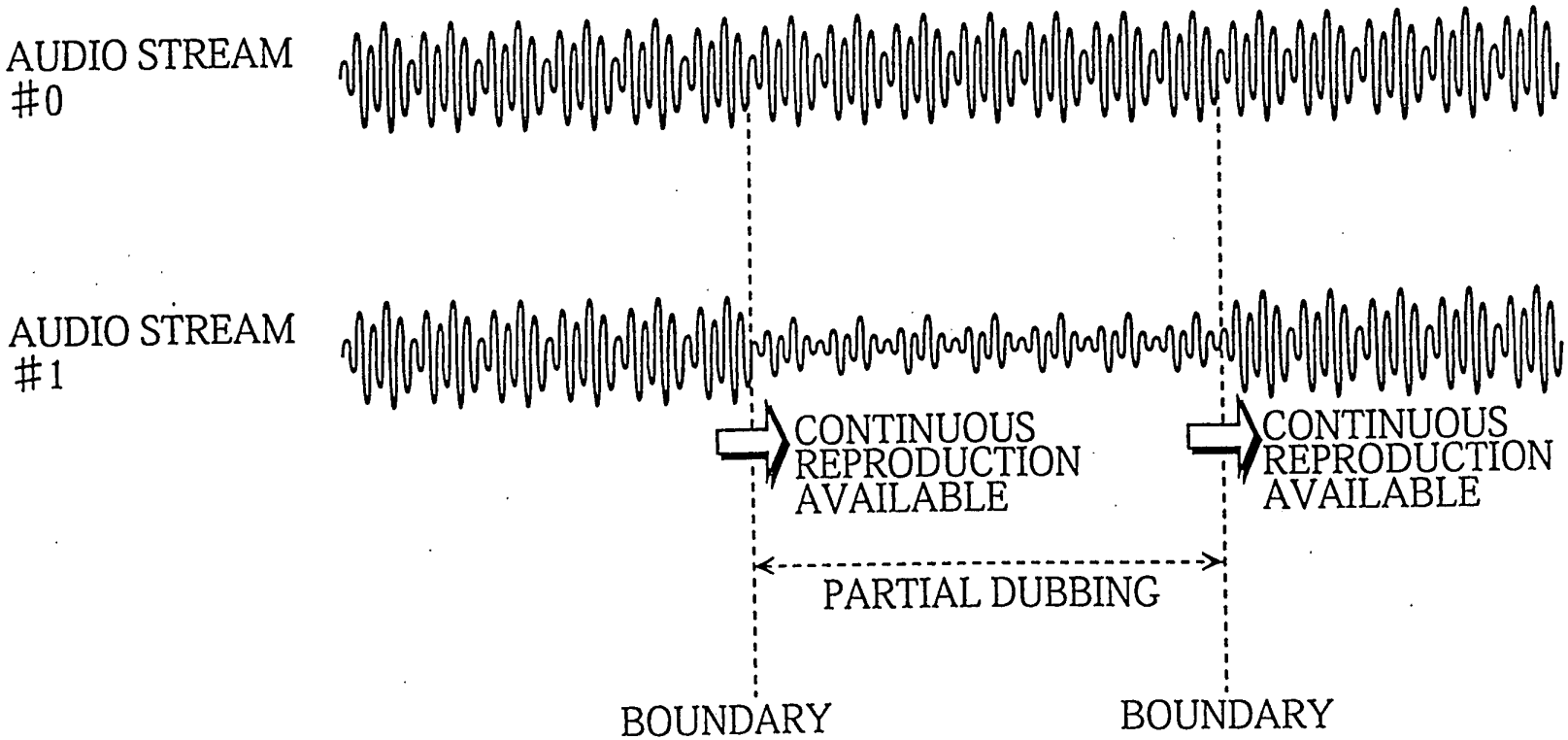

AUDIO STREAM #0
AUDIO STREAM #1
CONTINUOUS REPRODUCTION AVAILABLE
CONTINUOUS REPRODUCTION AVAILABLE
PARTIAL DUBBING
BOUNDARY
BOUNDARY

FIG. 8

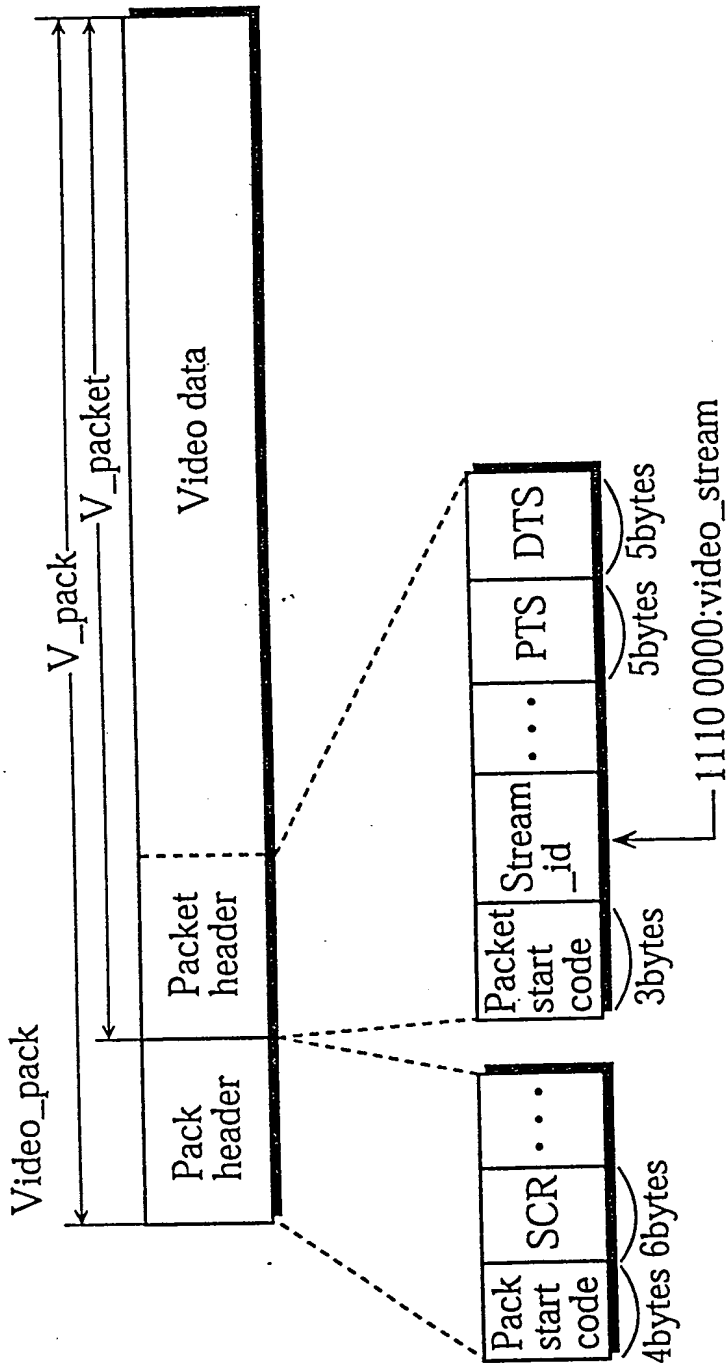

Video_pack
V_pack
V_packet
Pack header
Packet header
Video data
Pack start code
SCR
...
4bytes 6bytes
Packet start code
Stream _id
...
PTS
DTS
3bytes
5bytes 5bytes
1110 0000:video_stream

FIG. 9

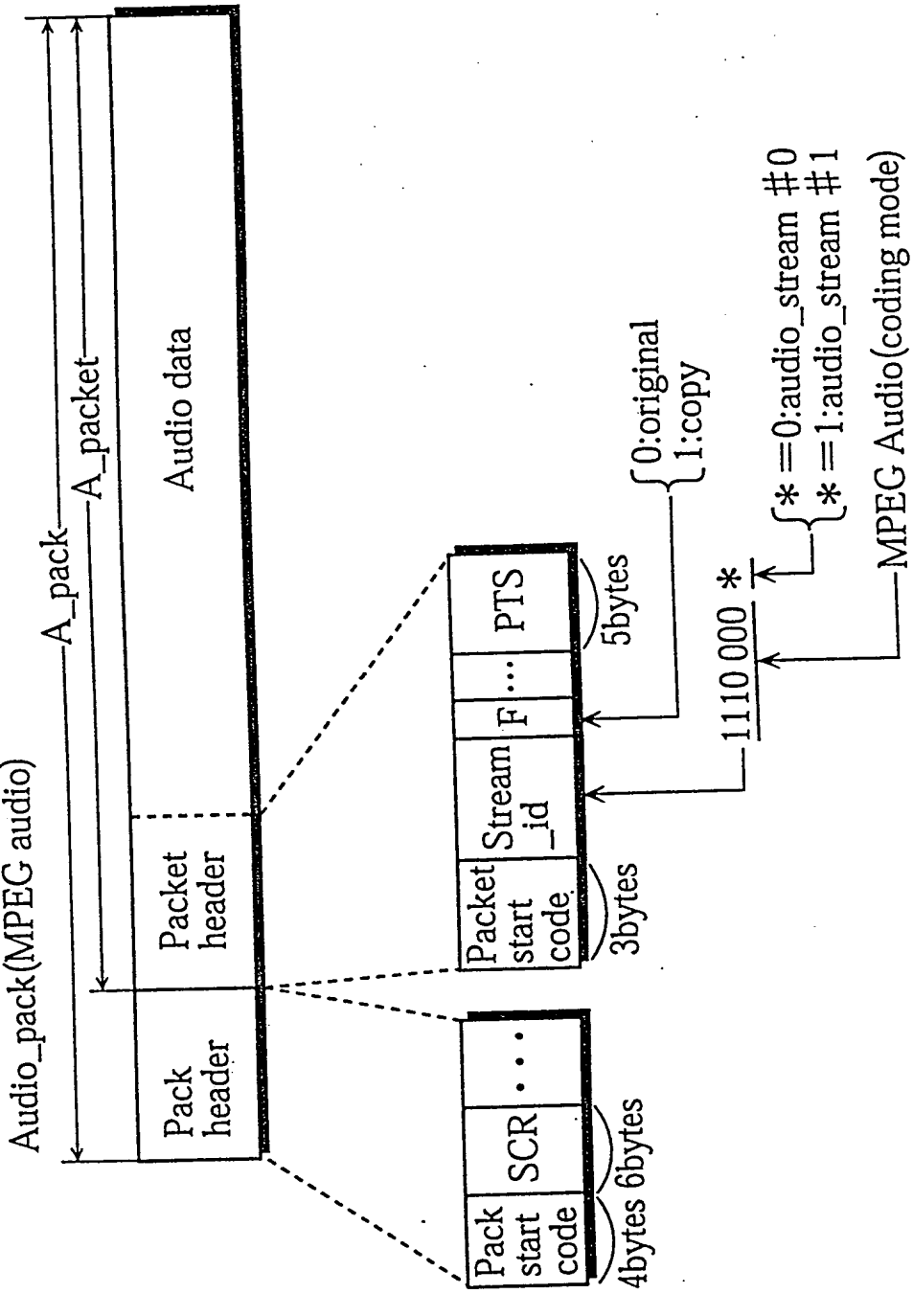

Audio_pack(MPEG audio)
A_pack
A_packet
Audio data
Pack header
Packet header
Pack start code
SCR
• • •
4bytes 6bytes
Packet start code
Stream _id
F
• • •
PTS
3bytes
5bytes
0:original
1:copy
1110 000 *
*=0:audio_stream #0
*=1:audio_stream #1
MPEG Audio(coding mode)

FIG. 10

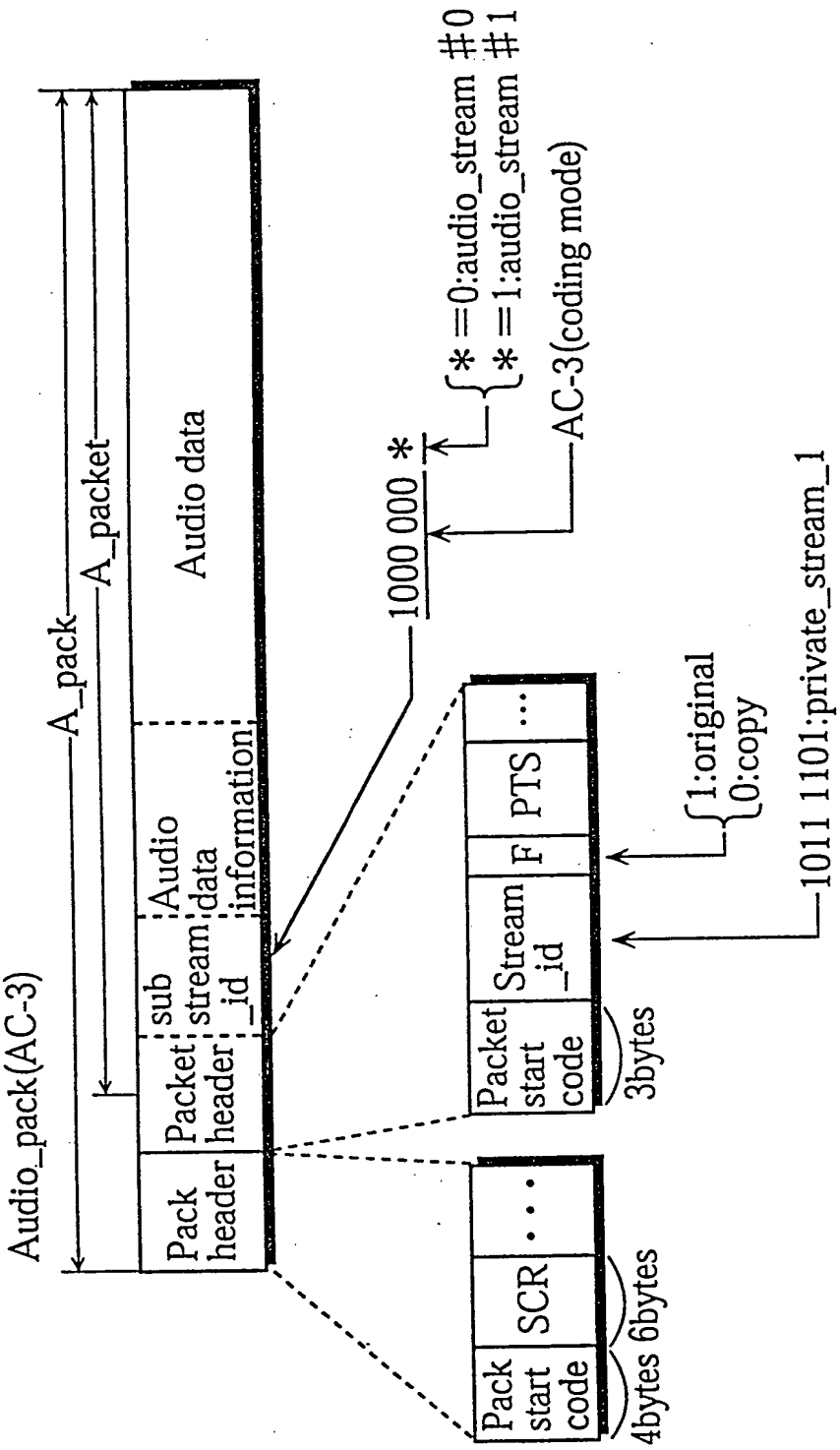

Audio_pack(AC-3)
A_pack
A_packet
Pack header
Packet header
sub stream_id
Audio data information
Audio data
Pack start code
SCR
4bytes 6bytes
Packet start code
Stream _id
F
PTS
3bytes
1000 000 *
* =0:audio_stream #0
* =1:audio_stream #1
AC-3(coding mode)
1:original
0:copy
1011 1101:private_stream_1

FIG. 11

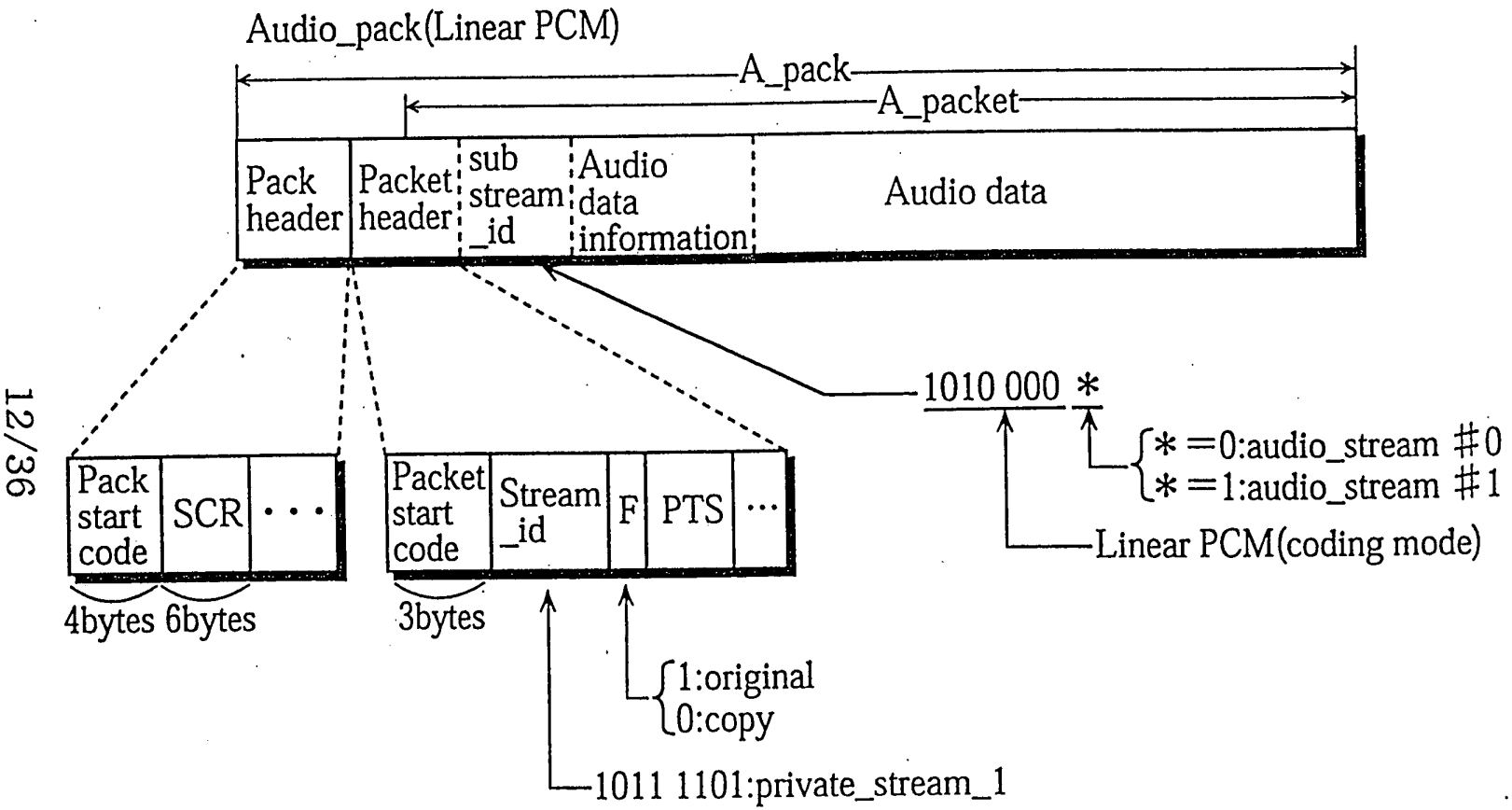

Audio_pack(Linear PCM)
A_pack
A_packet
Pack header
Packet header
sub stream _id
Audio data information
Audio data
1010 000 *
*=0:audio_stream #0
*=1:audio_stream #1
Linear PCM(coding mode)
Pack start code
SCR
Packet start code
Stream _id
F
PTS
4bytes 6bytes
3bytes
1:original
0:copy
1011 1101:private_stream_1

FIG. 12

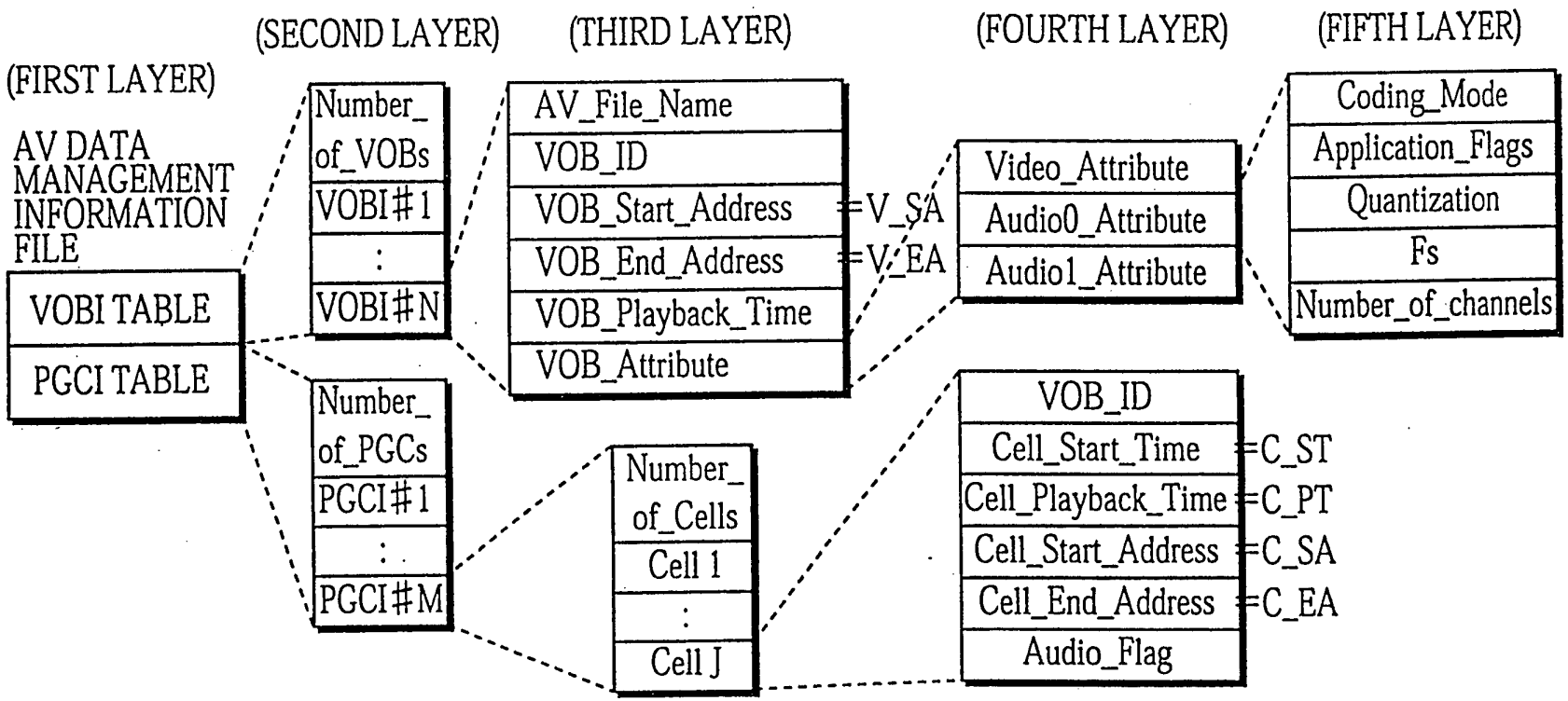

(FIRST LAYER)
(SECOND LAYER)
(THIRD LAYER)
(FOURTH LAYER)
(FIFTH LAYER)
AV DATA MANAGEMENT INFORMATION FILE
VOBI TABLE
PGCI TABLE
Number_ of_VOBs
VOBI#1
:
VOBI#N
Number_ of_PGCs
PGCI#1
:
PGCI#M
AV_File_Name
VOB_ID
VOB_Start_Address
VOB_End_Address
VOB_Playback_Time
VOB_Attribute
=V_SA
=V_EA
Number_ of_Cells
Cell 1
:
Cell J
Video_Attribute
Audio0_Attribute
Audio1_Attribute
VOB_ID
Cell_Start_Time
Cell_Playback_Time
Cell_Start_Address
Cell_End_Address
Audio_Flag
=C_ST
=C_PT
=C_SA
=C_EA
Coding_Mode
Application_Flags
Quantization
Fs
Number_of_channels

FIG. 13

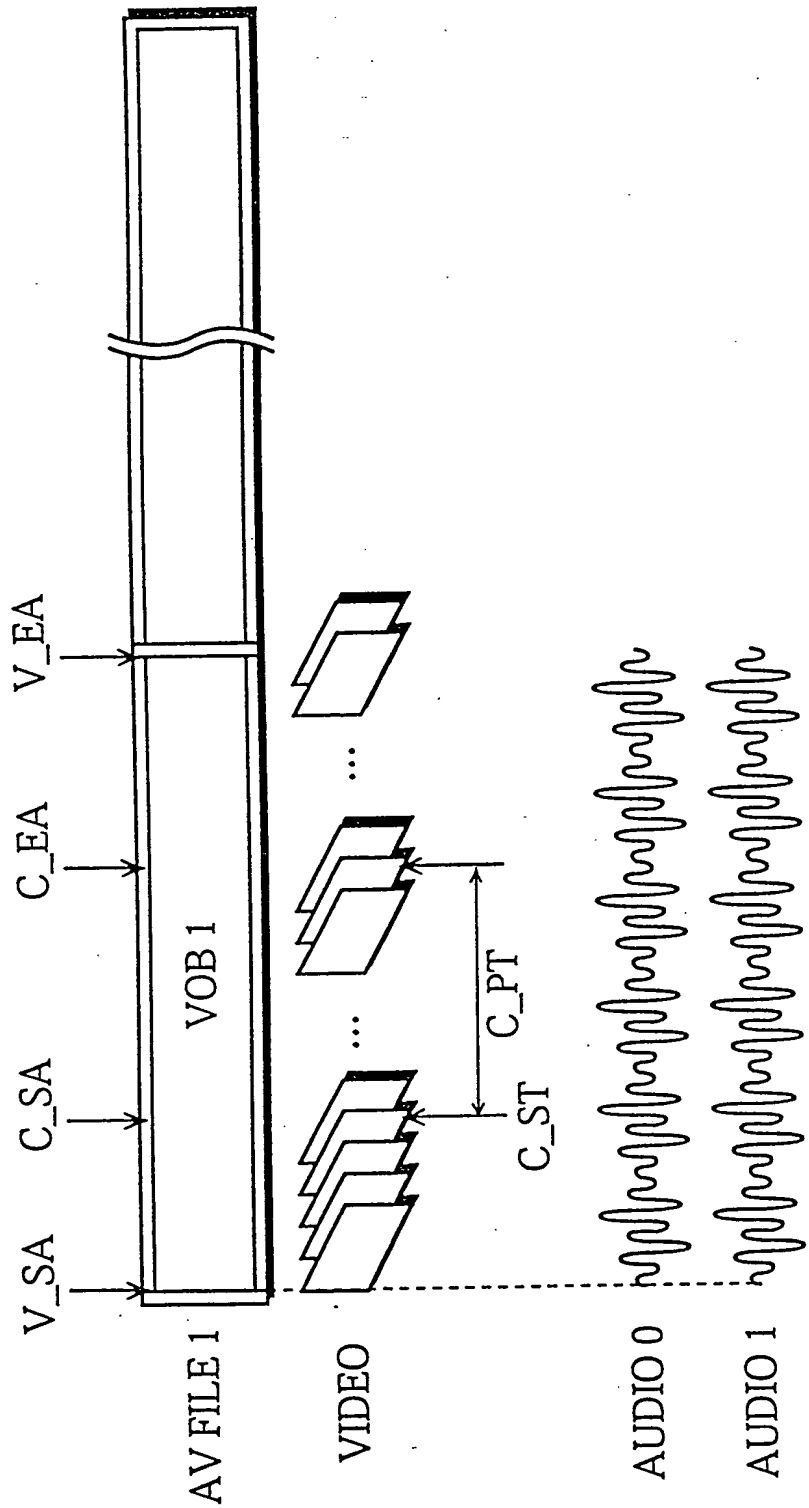
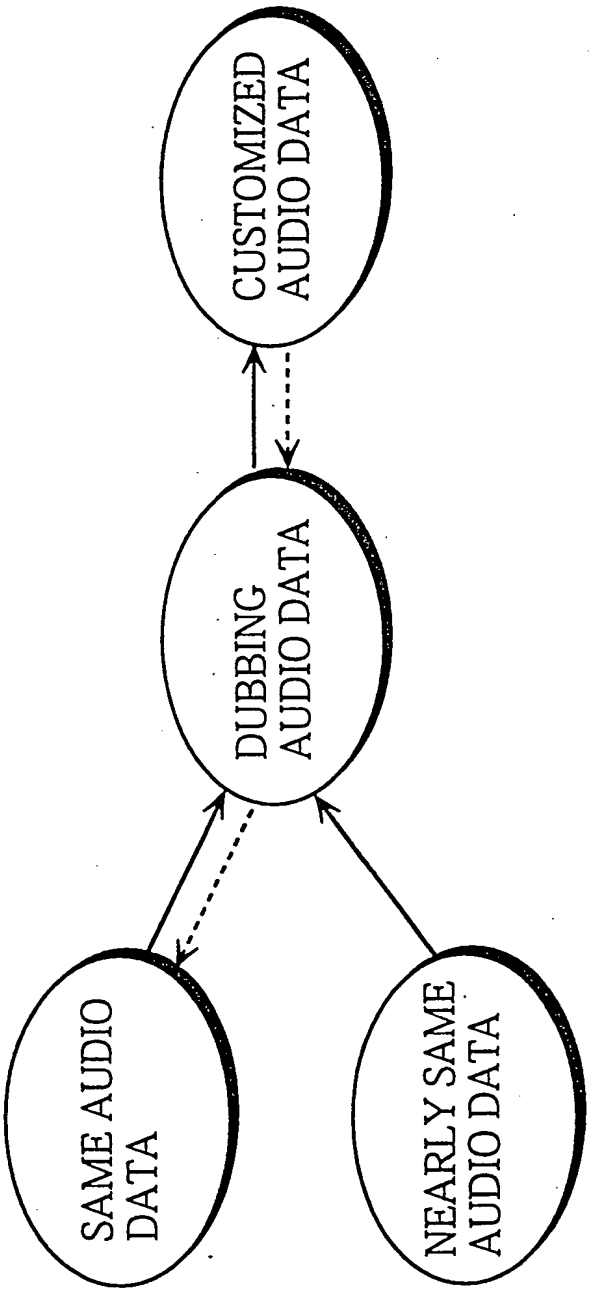


FIG. 14


CUSTOMIZED AUDIO DATA
DUBBING AUDIO DATA
SAME AUDIO DATA
NEARLY SAME AUDIO DATA

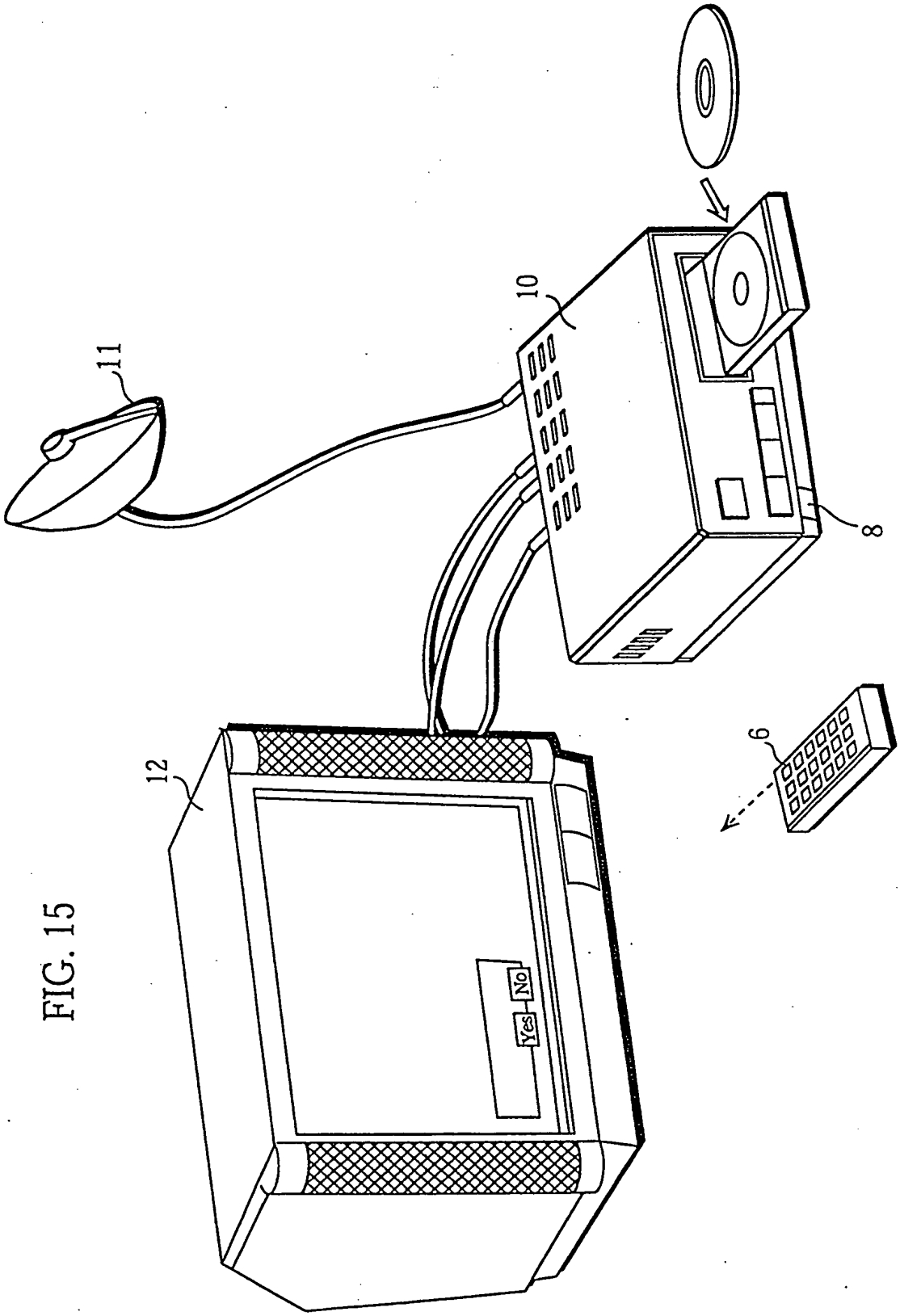


FIG. 15

FIG. 16

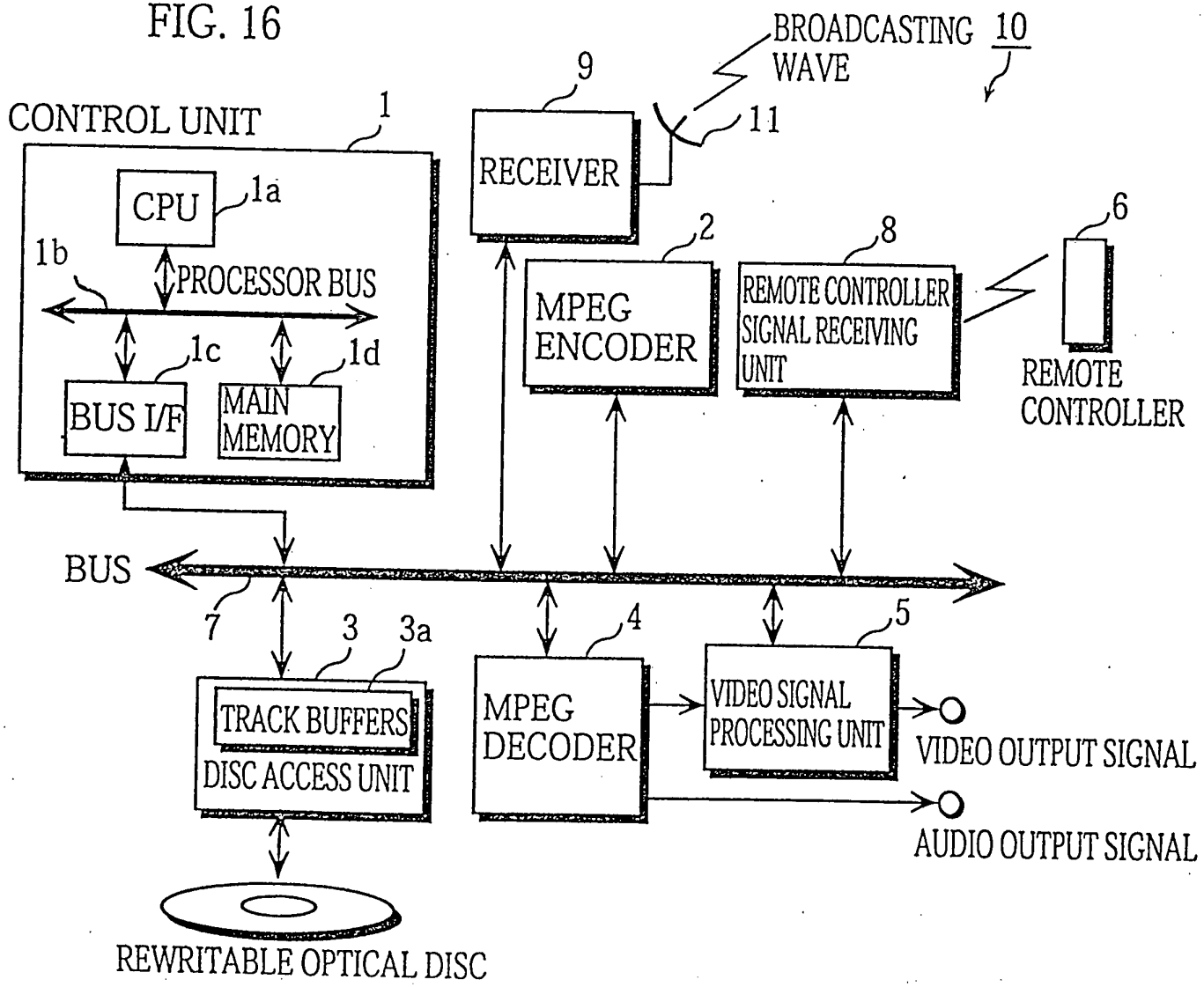

BROADCASTING WAVE
10
9
11
CONTROL UNIT
1
RECEIVER
CPU
1a
1b
PROCESSOR BUS
2
8
6
MPEG ENCODER
REMOTE CONTROLLER SIGNAL RECEIVING UNIT
REMOTE CONTROLLER
1c
1d
BUS I/F
MAIN MEMORY
BUS
7
3
3a
4
5
TRACK BUFFERS
DISC ACCESS UNIT
MPEG DECODER
VIDEO SIGNAL PROCESSING UNIT
VIDEO OUTPUT SIGNAL
AUDIO OUTPUT SIGNAL
REWRITABLE OPTICAL DISC

FIG. 17

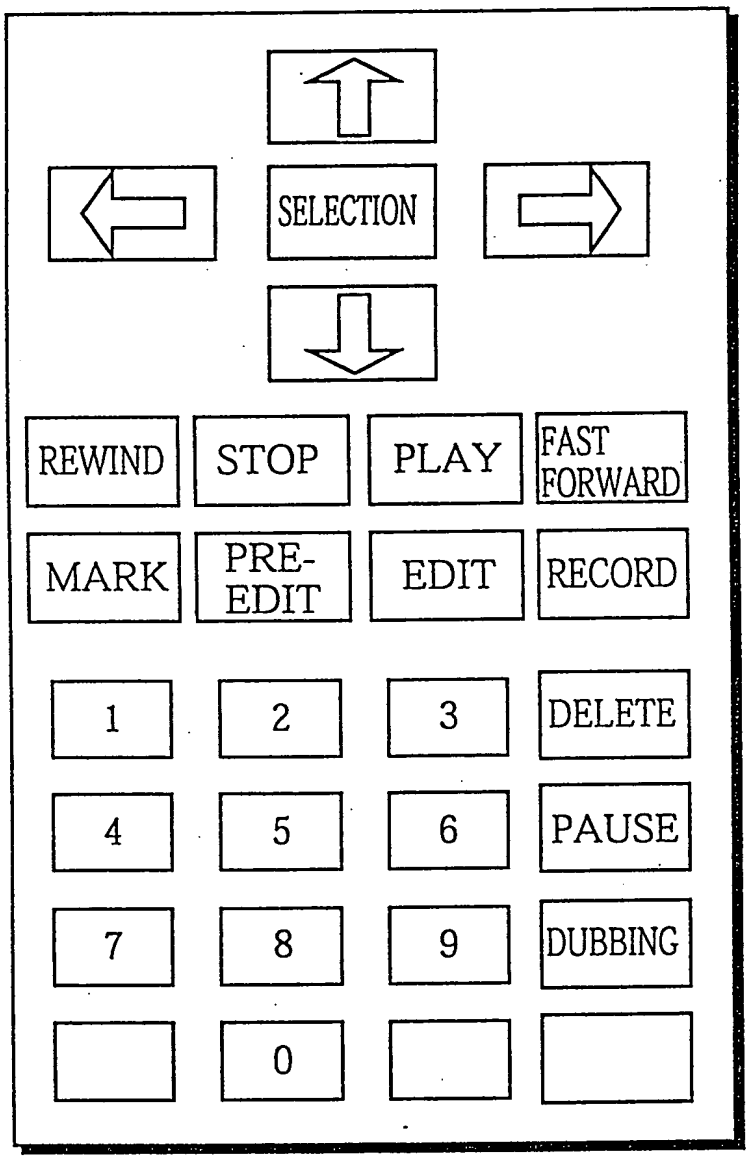

SELECTION
REWIND
STOP
PLAY
FAST FORWARD
MARK
PRE-EDIT
EDIT
RECORD
1
2
3
DELETE
4
5
6
PAUSE
7
8
9
DUBBING
0

FIG. 18

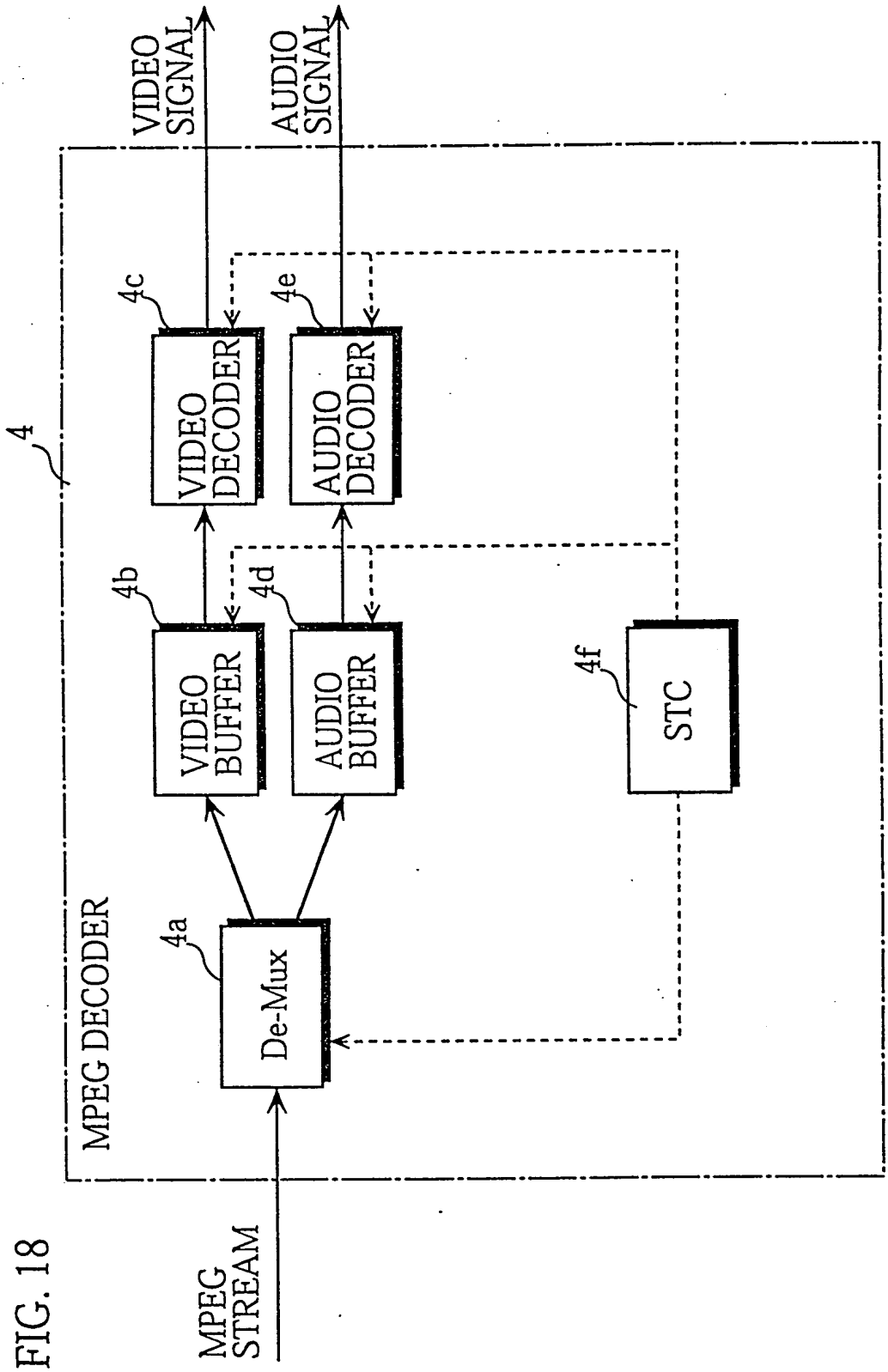

MPEG STREAM
MPEG DECODER
4
4a
De-Mux
4b
VIDEO BUFFER
4d
AUDIO BUFFER
4f
STC
4c
VIDEO DECODER
4e
AUDIO DECODER
VIDEO SIGNAL
AUDIO SIGNAL

FIG. 19

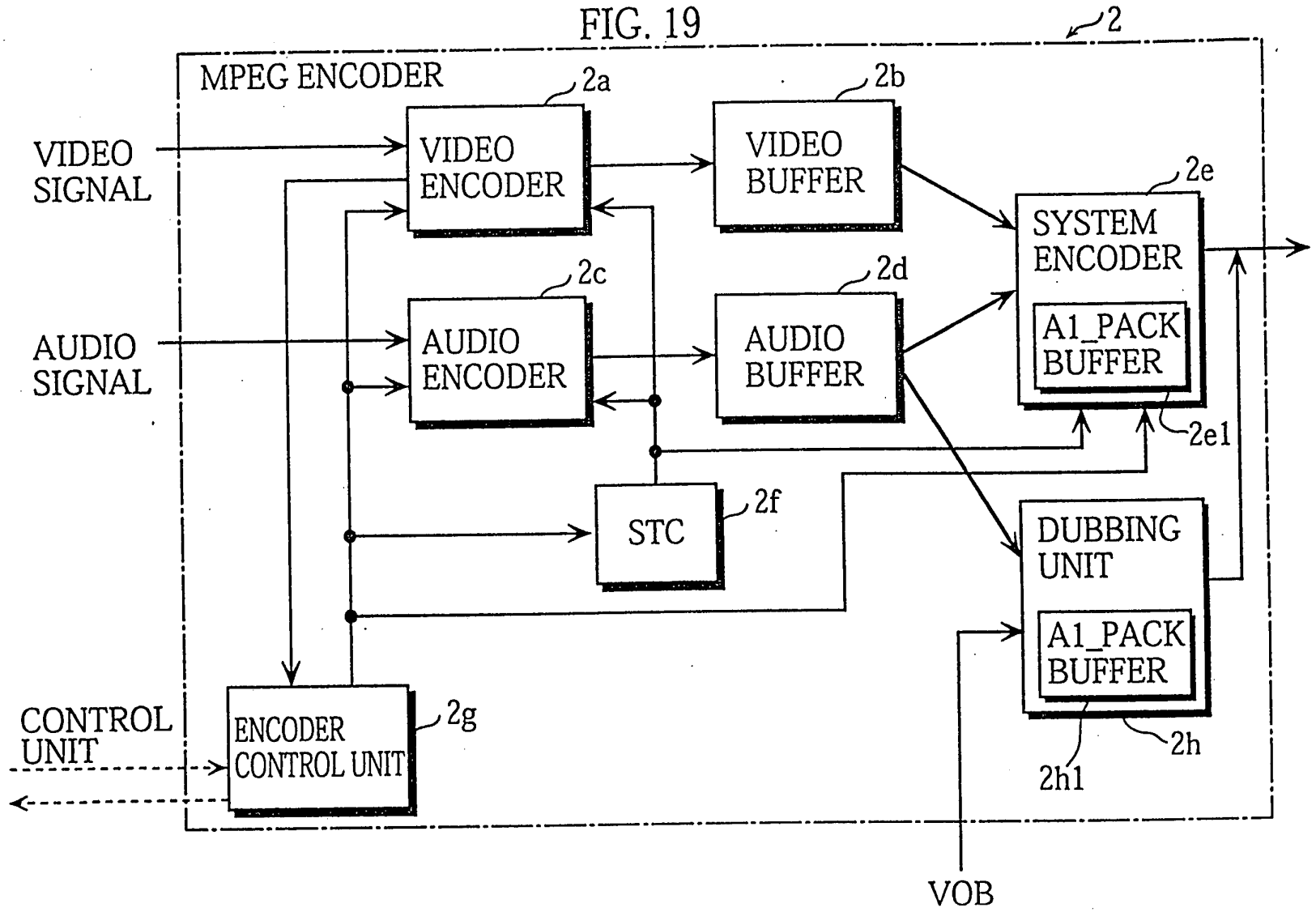
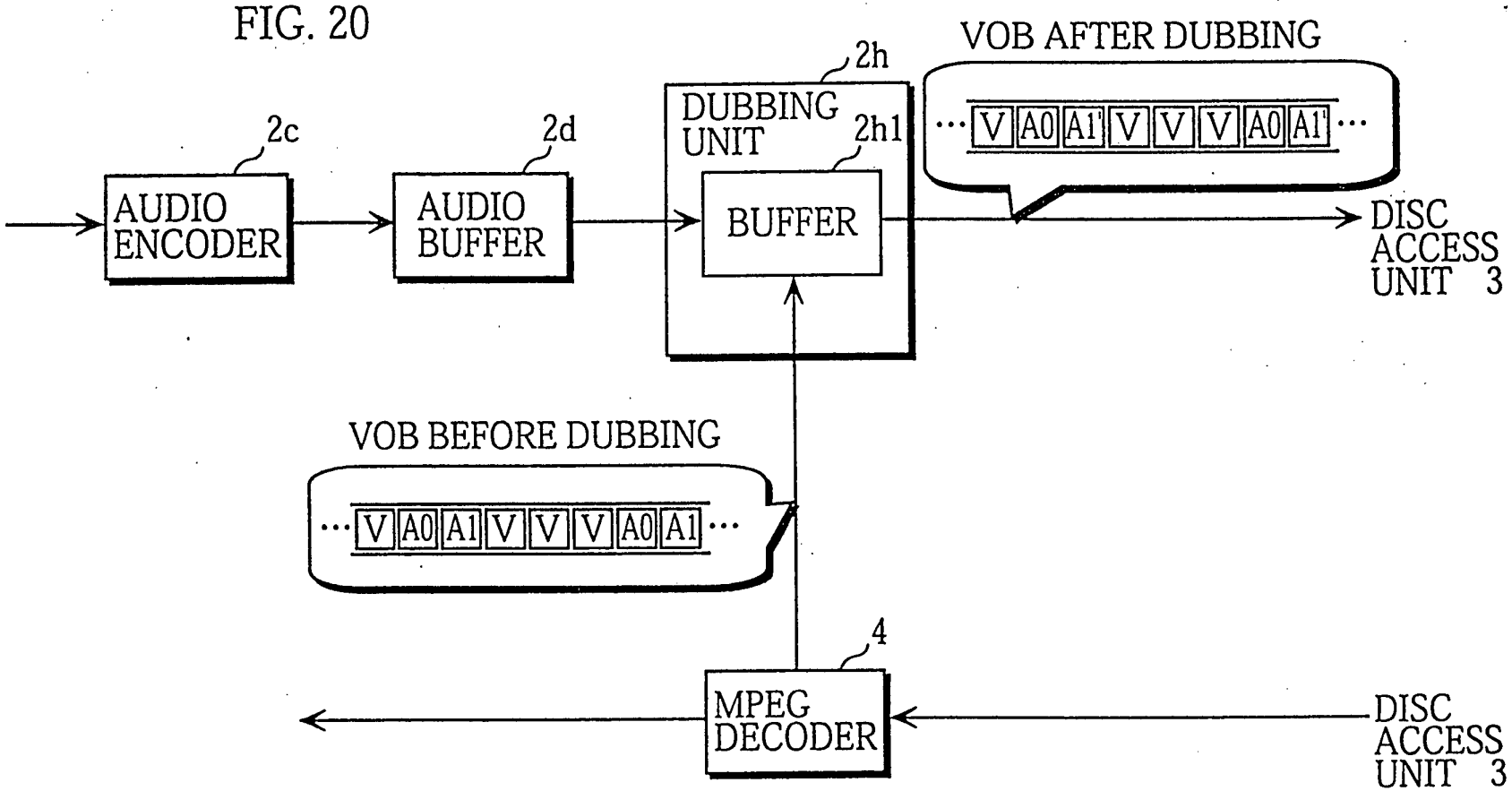

2
MPEG ENCODER
2a
2b
VIDEO SIGNAL
VIDEO ENCODER
VIDEO BUFFER
2e
SYSTEM ENCODER
A1_PACK BUFFER
2e1
2c
2d
AUDIO SIGNAL
AUDIO ENCODER
AUDIO BUFFER
STC
2f
DUBBING UNIT
A1_PACK BUFFER
2h
2h1
CONTROL UNIT
ENCODER CONTROL UNIT
2g
VOB

FIG. 20


2h
VOB AFTER DUBBING
2c
2d
DUBBING UNIT
2h1
AUDIO ENCODER
AUDIO BUFFER
BUFFER
V A0 A1' V V V A0 A1'
DISC ACCESS UNIT 3
VOB BEFORE DUBBING
V A0 A1 V V V A0 A1
4
MPEG DECODER
DISC ACCESS UNIT 3

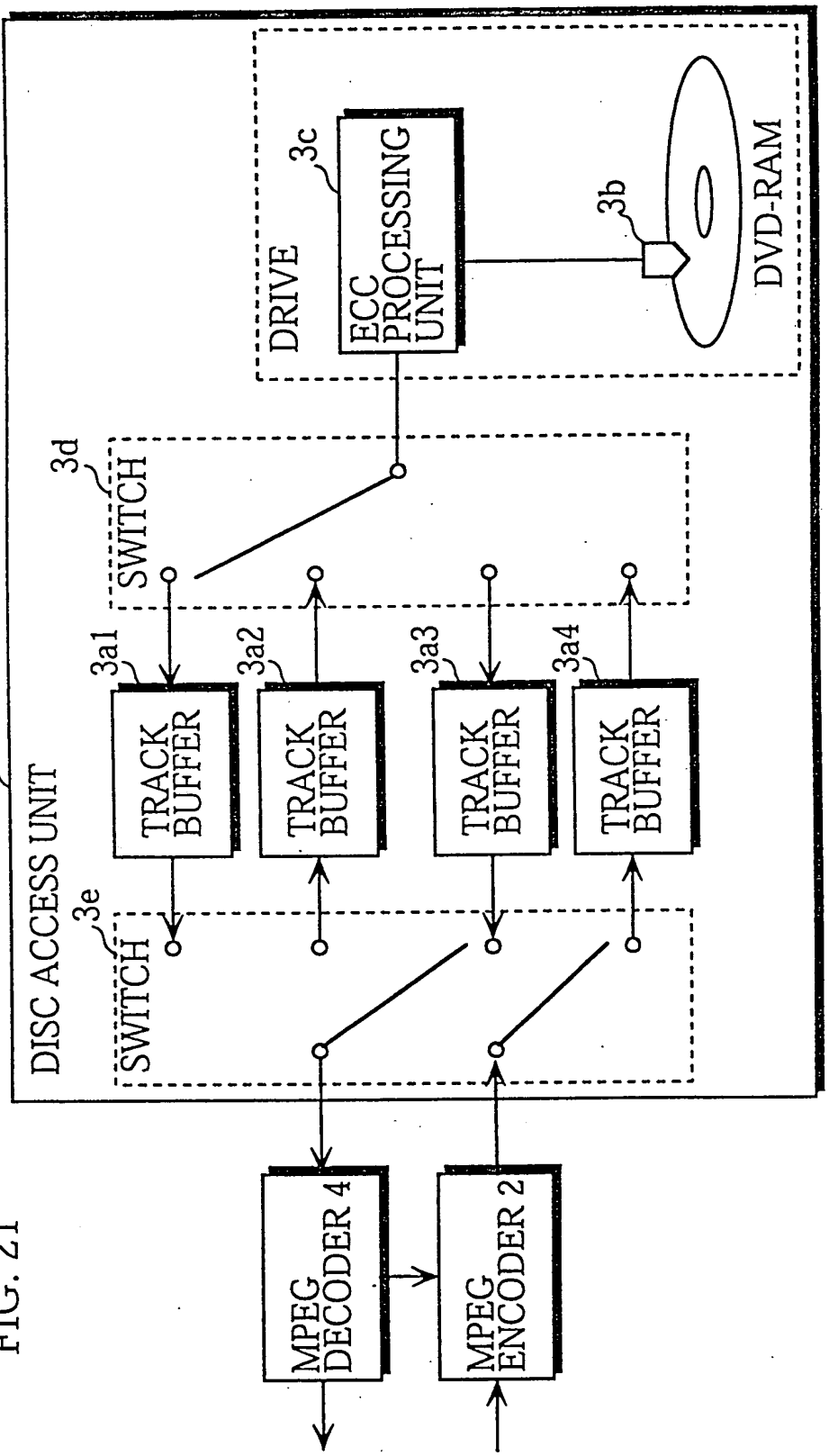

3
DISC ACCESS UNIT
DRIVE
3c
ECC PROCESSING UNIT
3b
DVD-RAM
3d
SWITCH
3a1
3a2
3a3
3a4
TRACK BUFFER
TRACK BUFFER
TRACK BUFFER
TRACK BUFFER
3e
SWITCH
MPEG DECODER 4
MPEG ENCODER 2

FIG. 21

FIG. 22

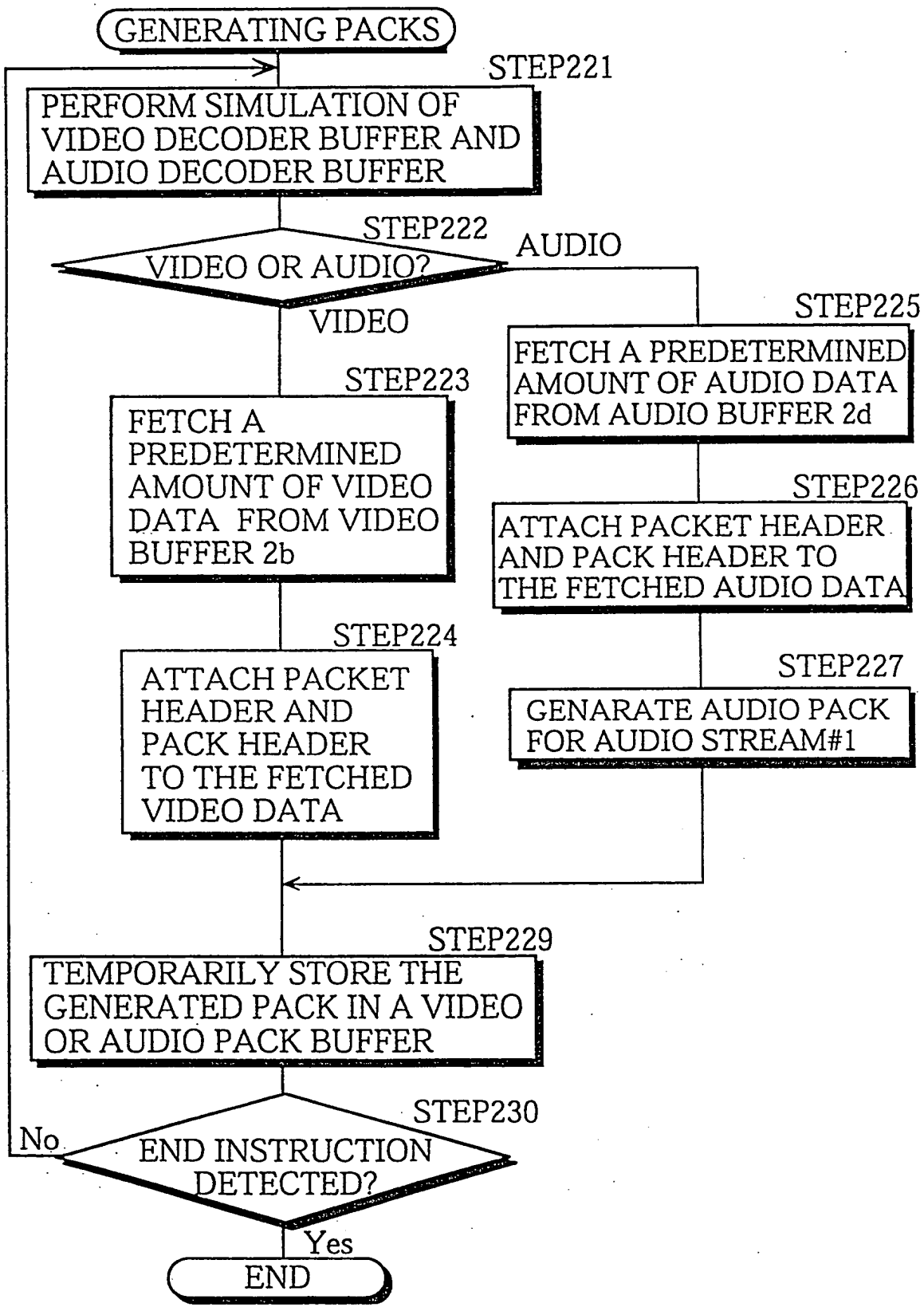

GENERATING PACKS
STEP221
PERFORM SIMULATION OF VIDEO DECODER BUFFER AND AUDIO DECODER BUFFER
STEP222
VIDEO OR AUDIO?
AUDIO
VIDEO
STEP225
FETCH A PREDETERMINED AMOUNT OF AUDIO DATA FROM AUDIO BUFFER 2d
STEP223
FETCH A PREDETERMINED AMOUNT OF VIDEO DATA FROM VIDEO BUFFER 2b
STEP226
ATTACH PACKET HEADER AND PACK HEADER TO THE FETCHED AUDIO DATA
STEP224
ATTACH PACKET HEADER AND PACK HEADER TO THE FETCHED VIDEO DATA
STEP227
GENARATE AUDIO PACK FOR AUDIO STREAM#1
STEP229
TEMPORARILY STORE THE GENERATED PACK IN A VIDEO OR AUDIO PACK BUFFER
STEP230
No
END INSTRUCTION DETECTED?
Yes
END

FIG. 23

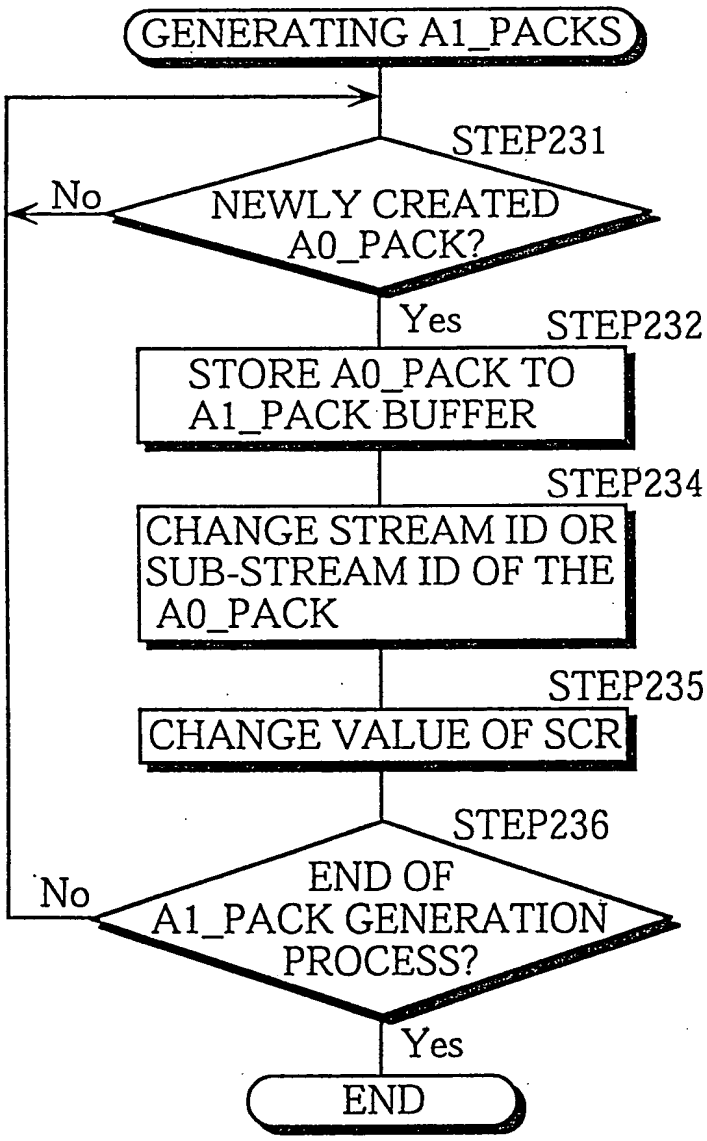

GENERATING A1_PACKS
STEP231
NEWLY CREATED A0_PACK?
No
Yes
STEP232
STORE A0_PACK TO A1_PACK BUFFER
STEP234
CHANGE STREAM ID OR SUB-STREAM ID OF THE A0_PACK
STEP235
CHANGE VALUE OF SCR
STEP236
END OF A1_PACK GENERATION PROCESS?
No
Yes
END

FIG. 24

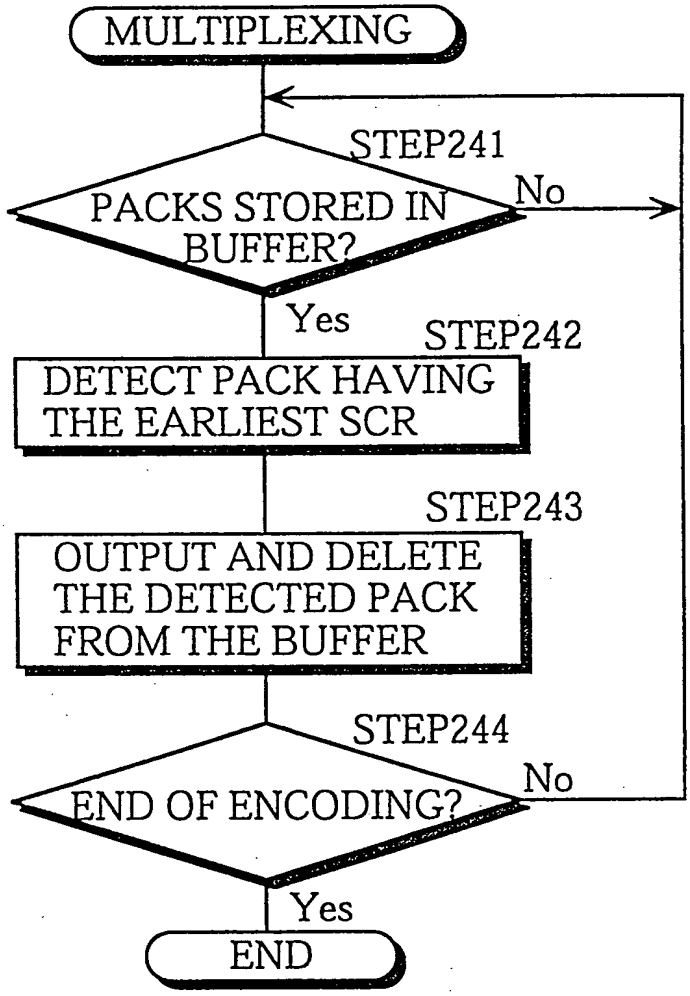

MULTIPLEXING
STEP241
PACKS STORED IN BUFFER?
No
Yes
STEP242
DETECT PACK HAVING THE EARLIEST SCR
STEP243
OUTPUT AND DELETE THE DETECTED PACK FROM THE BUFFER
STEP244
END OF ENCODING?
No
Yes
END

FIG. 25

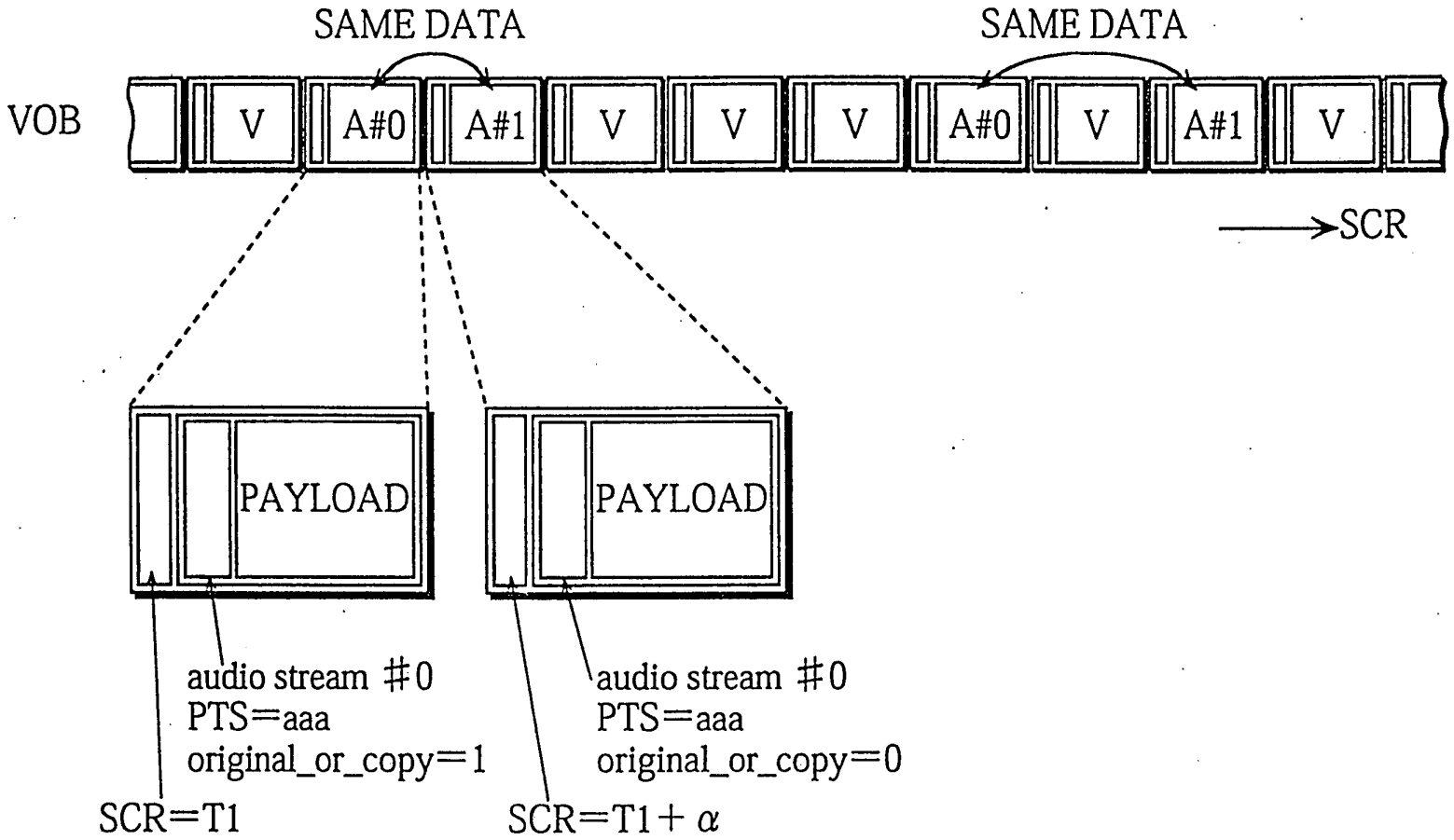

SAME DATA
SAME DATA
VOB
V
A#0
A#1
V
V
V
A#0
V
A#1
V
SCR
PAYLOAD
PAYLOAD
audio stream #0
PTS=aaa
original_or_copy=1
audio stream #0
PTS=aaa
original_or_copy=0
SCR=T1
SCR=T1+α

FIG. 26

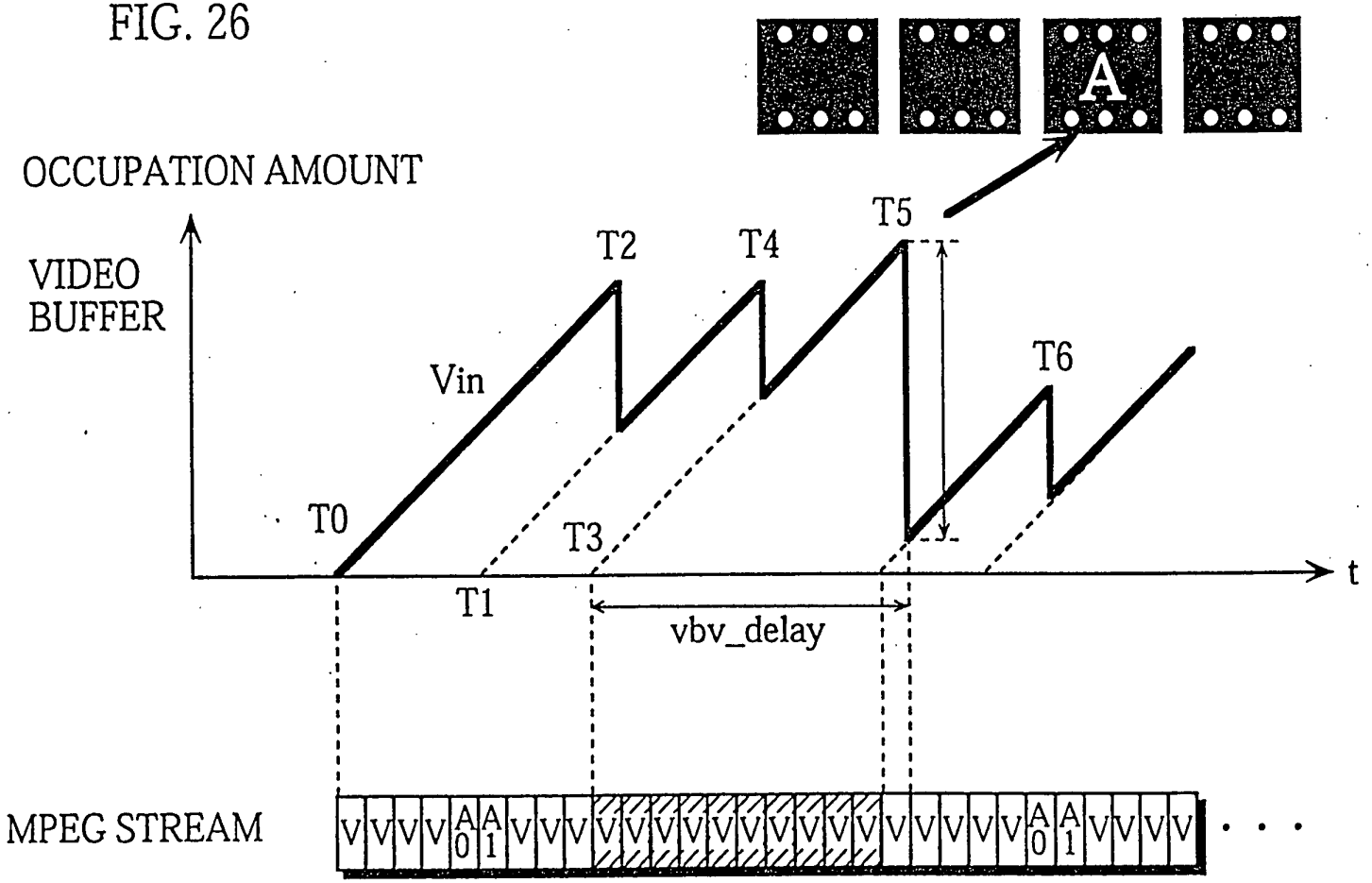

A
OCCUPATION AMOUNT
VIDEO BUFFER
T5
T2
T4
T6
Vin
T0
T3
T1
t
vbv_delay
MPEG STREAM
V V V V A0 A1 V V V V V V V V V V V V V V V V V V V V A0 A1 V V V V

FIG. 27

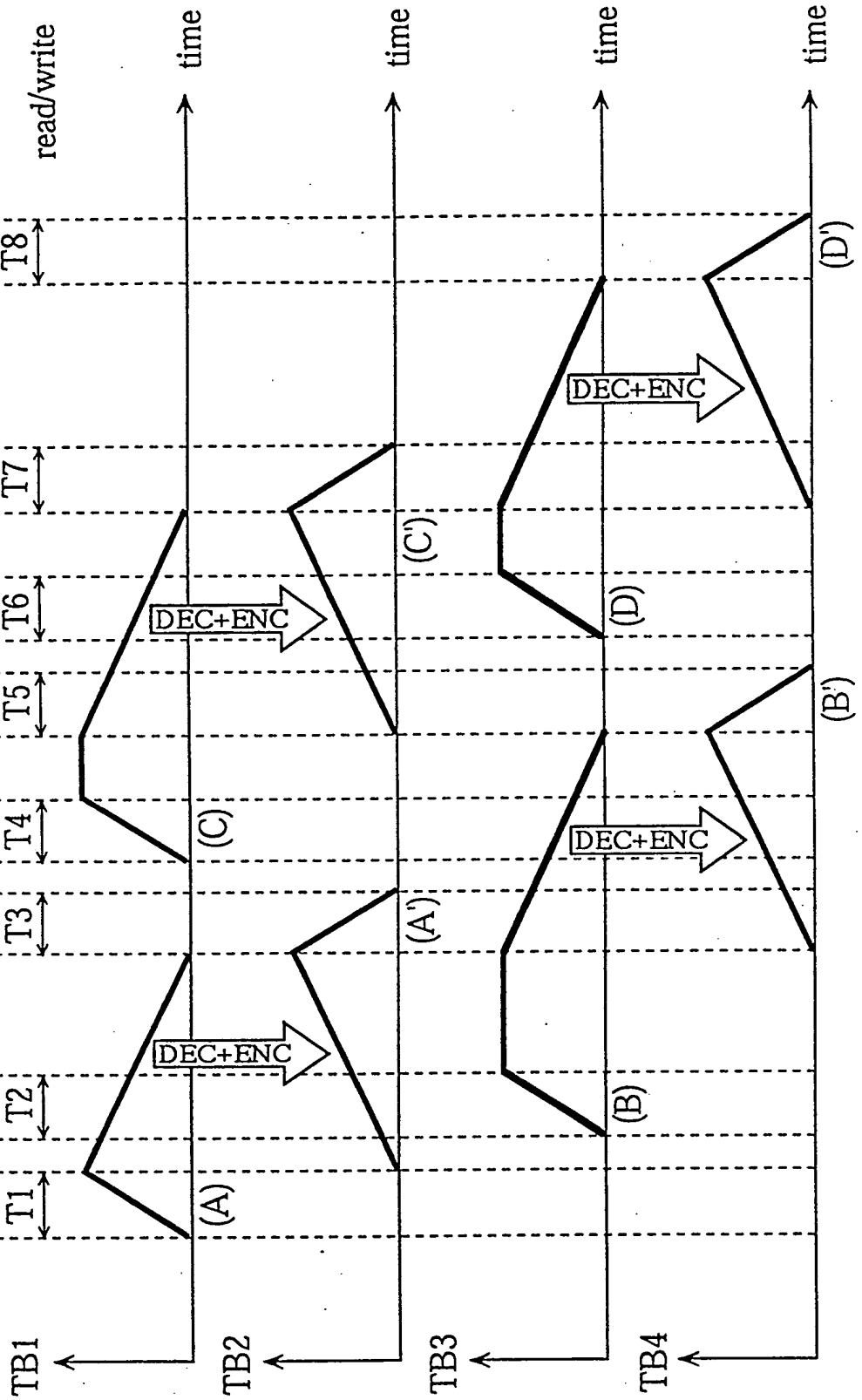

dubbing
read/write
time
time
time
time
T8
Td
T7
Tc
T6
T5
Tb
T4
T3
Ta
T2
T1
DEC+ENC
DEC+ENC
DEC+ENC
DEC+ENC
(A)
(C)
(A')
(C')
(B)
(D)
(B')
(D')
TB1
TB2
TB3
TB4

FIG. 28

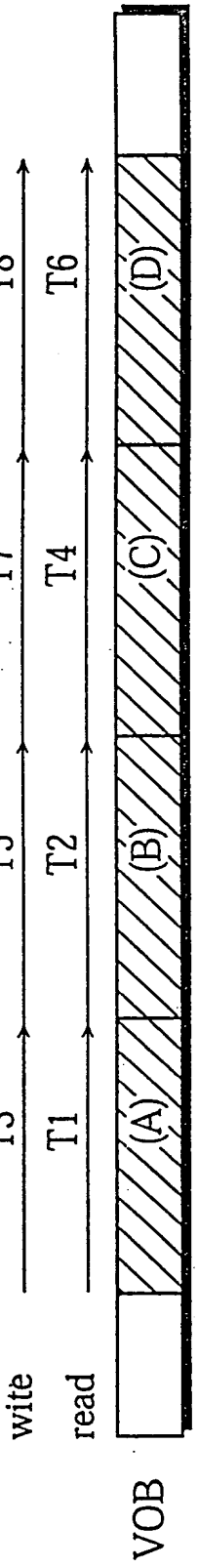


FIG. 29

	T1	Ta T2	Tb T3	Tb T4	Tc T5	Tc T6	Td T7	Td	T8	----
SWITCH 3d	1	3	2	1	4	3	2	1	4	----
SWITCH 3e DECODER 4 SIDE		1	3		1		3			----
SWITCH 3e ENCODER 2 SIDE		2	4		2		4			----

"1" TO "4" RESPECTIVELY REPRESENT TB1 TO TB4

FIG. 30

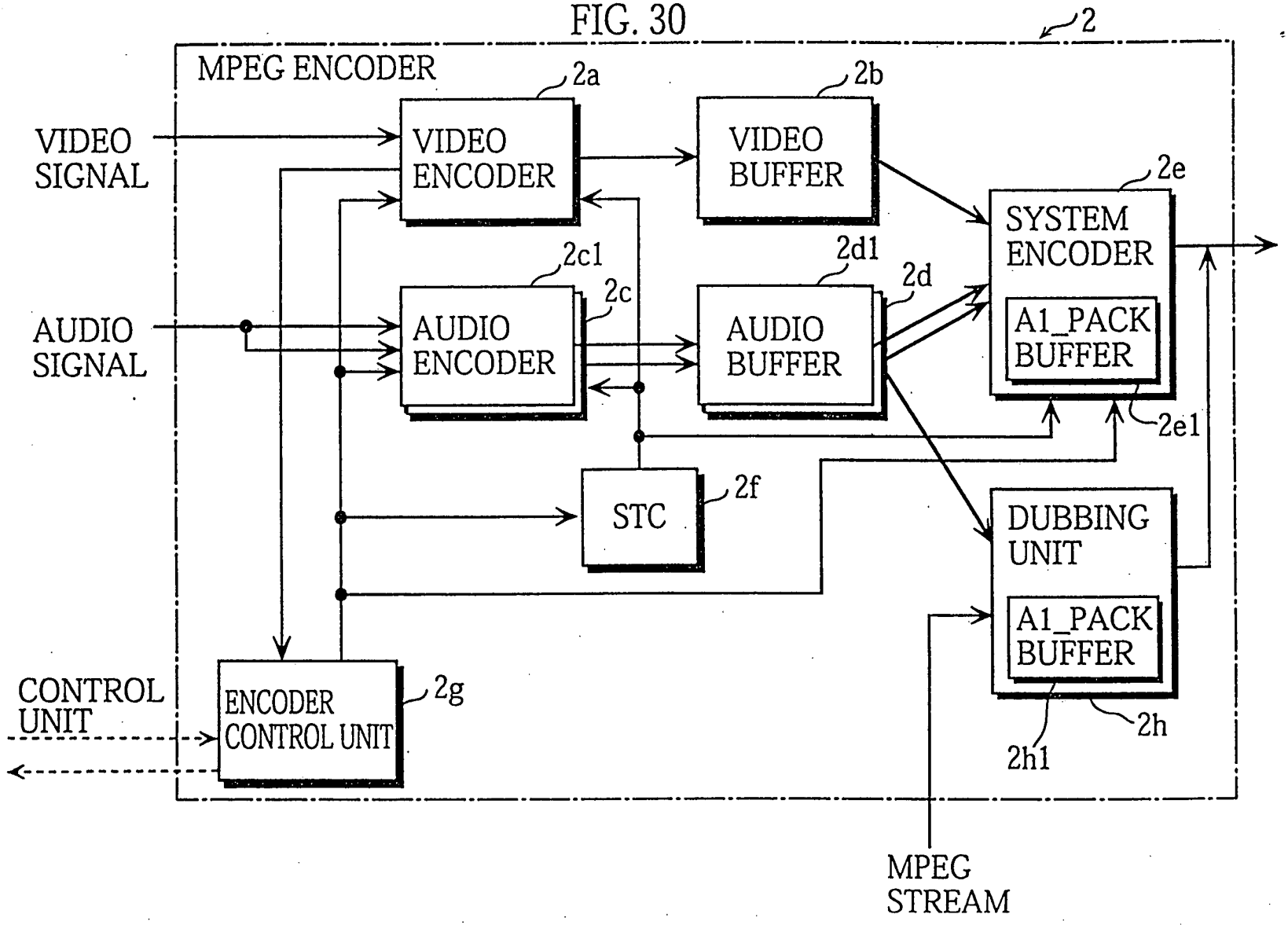

2
MPEG ENCODER
2a
2b
VIDEO SIGNAL
VIDEO ENCODER
VIDEO BUFFER
2e
SYSTEM ENCODER
A1_PACK BUFFER
2e1
2c1
2c
2d1
2d
AUDIO SIGNAL
AUDIO ENCODER
AUDIO BUFFER
2f
STC
DUBBING UNIT
A1_PACK BUFFER
2h
2h1
CONTROL UNIT
ENCODER CONTROL UNIT
2g
MPEG STREAM

FIG. 31

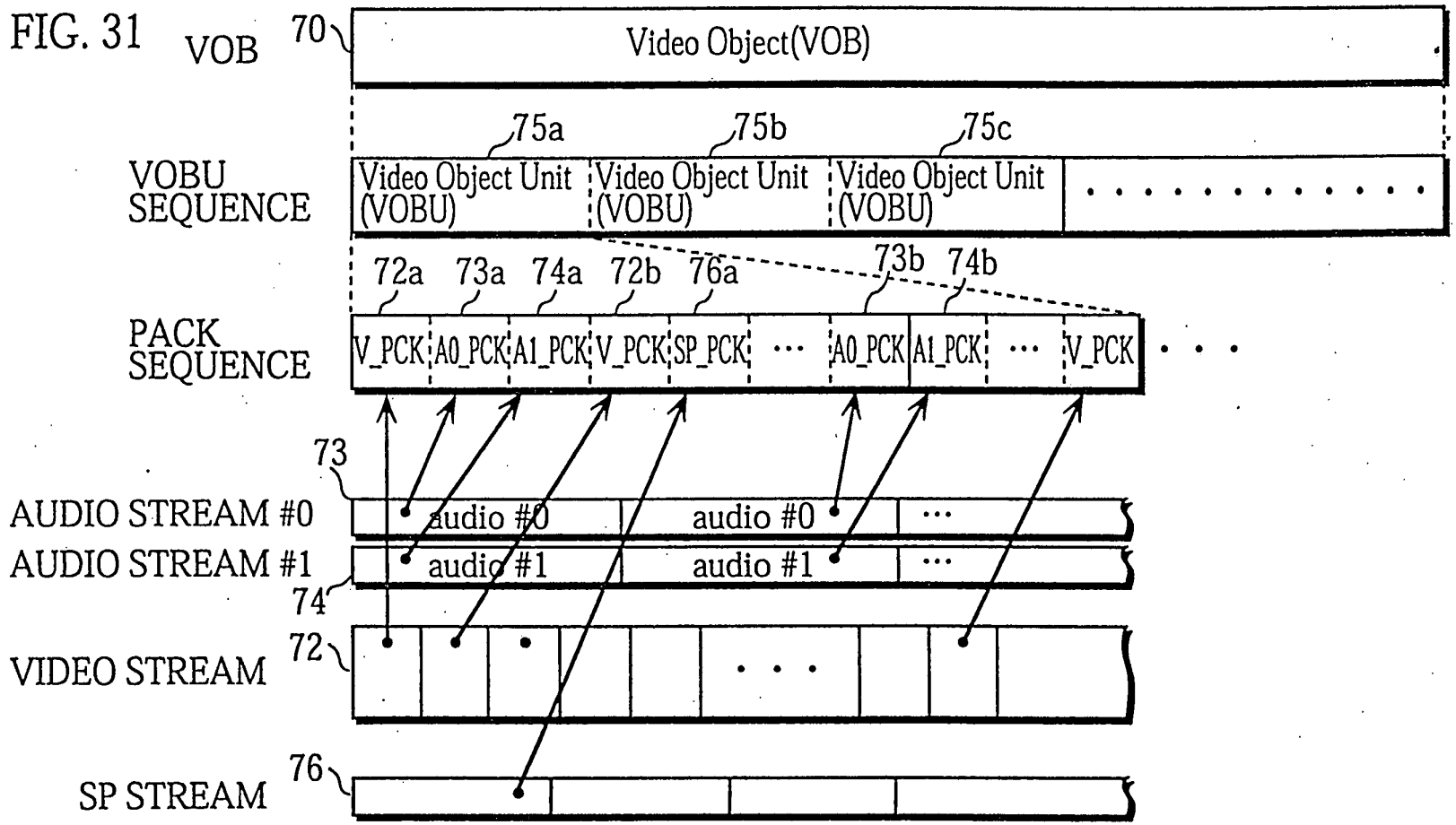

VOB
70
Video Object(VOB)
75a
75b
75c
VOBU SEQUENCE
Video Object Unit (VOBU)
Video Object Unit (VOBU)
Video Object Unit (VOBU)
72a
73a
74a
72b
76a
73b
74b
PACK SEQUENCE
V_PCK
A0_PCK
A1_PCK
V_PCK
SP_PCK
A0_PCK
A1_PCK
V_PCK
73
AUDIO STREAM #0
audio #0
audio #0
AUDIO STREAM #1
audio #1
audio #1
74
VIDEO STREAM
72
SP STREAM
76

FIG. 32

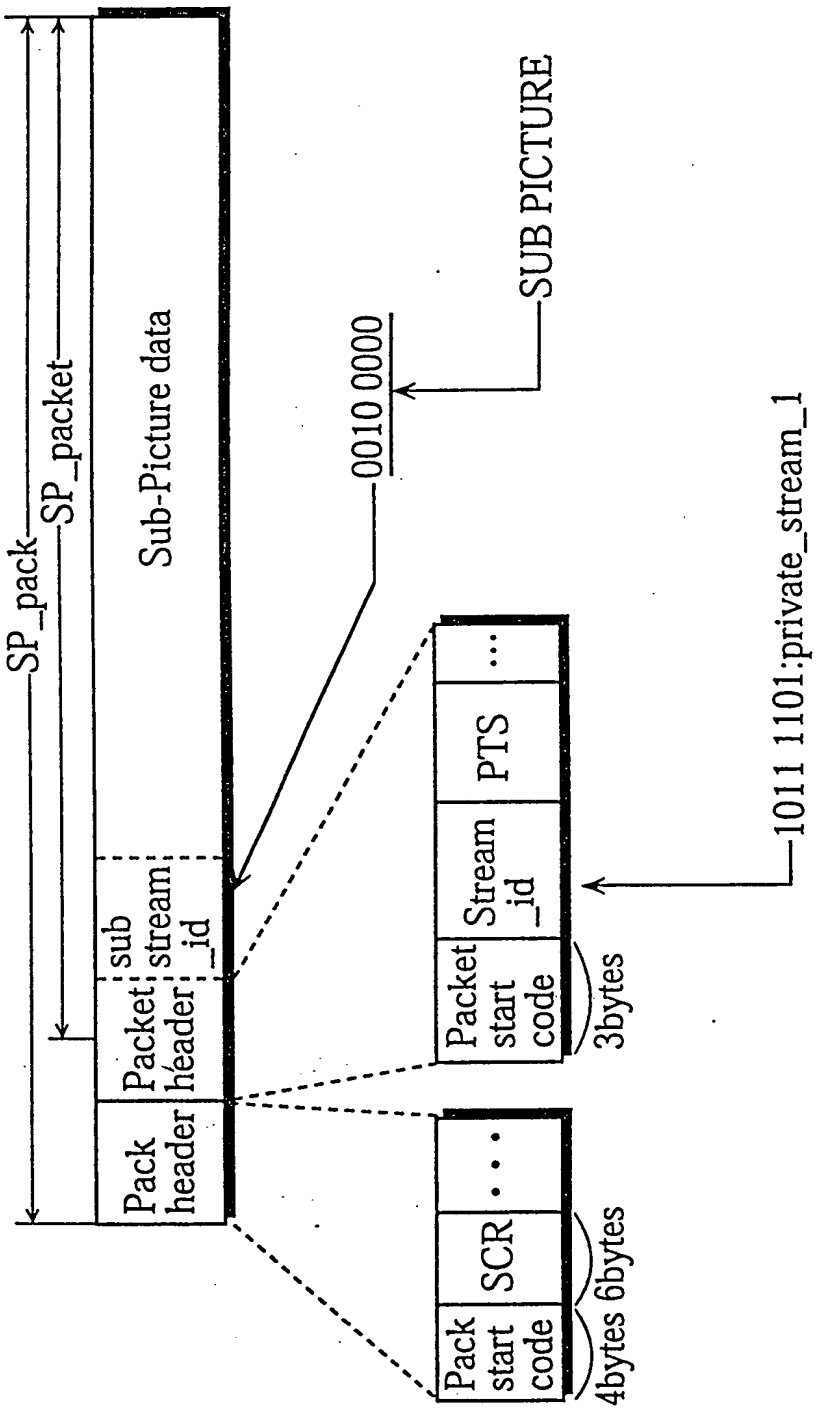

SP_pack
SP_packet
Pack header
Packet header
sub stream _id
Sub-Picture data
0010 0000
SUB PICTURE
1011 1101:private_stream_1
Pack start code
SCR
• • •
4bytes
6bytes
Packet start code
Stream _id
PTS
...
3bytes

FIG. 33

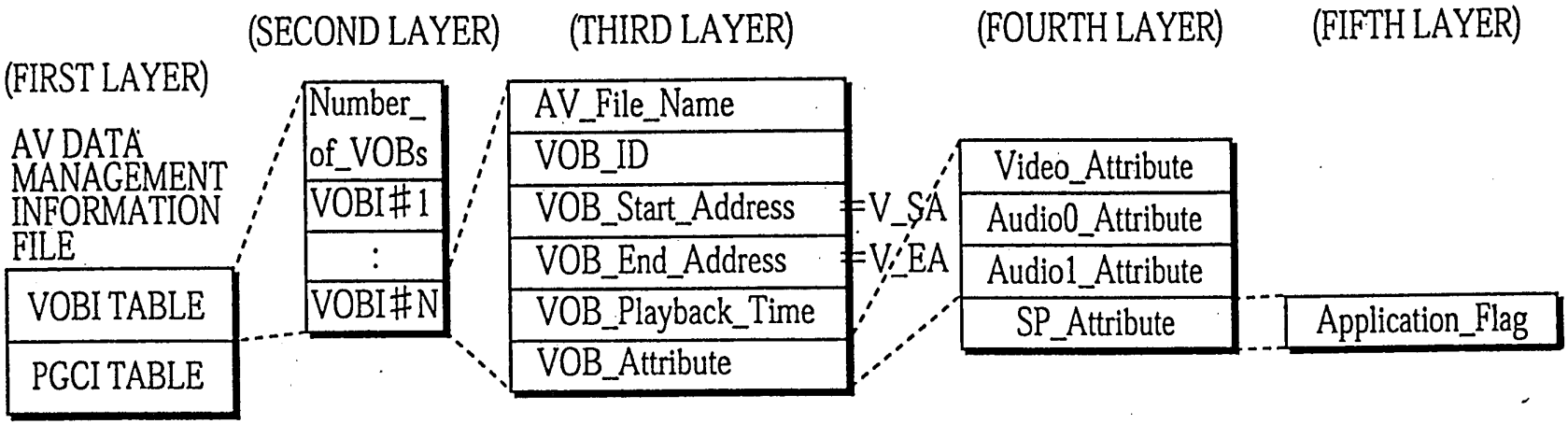
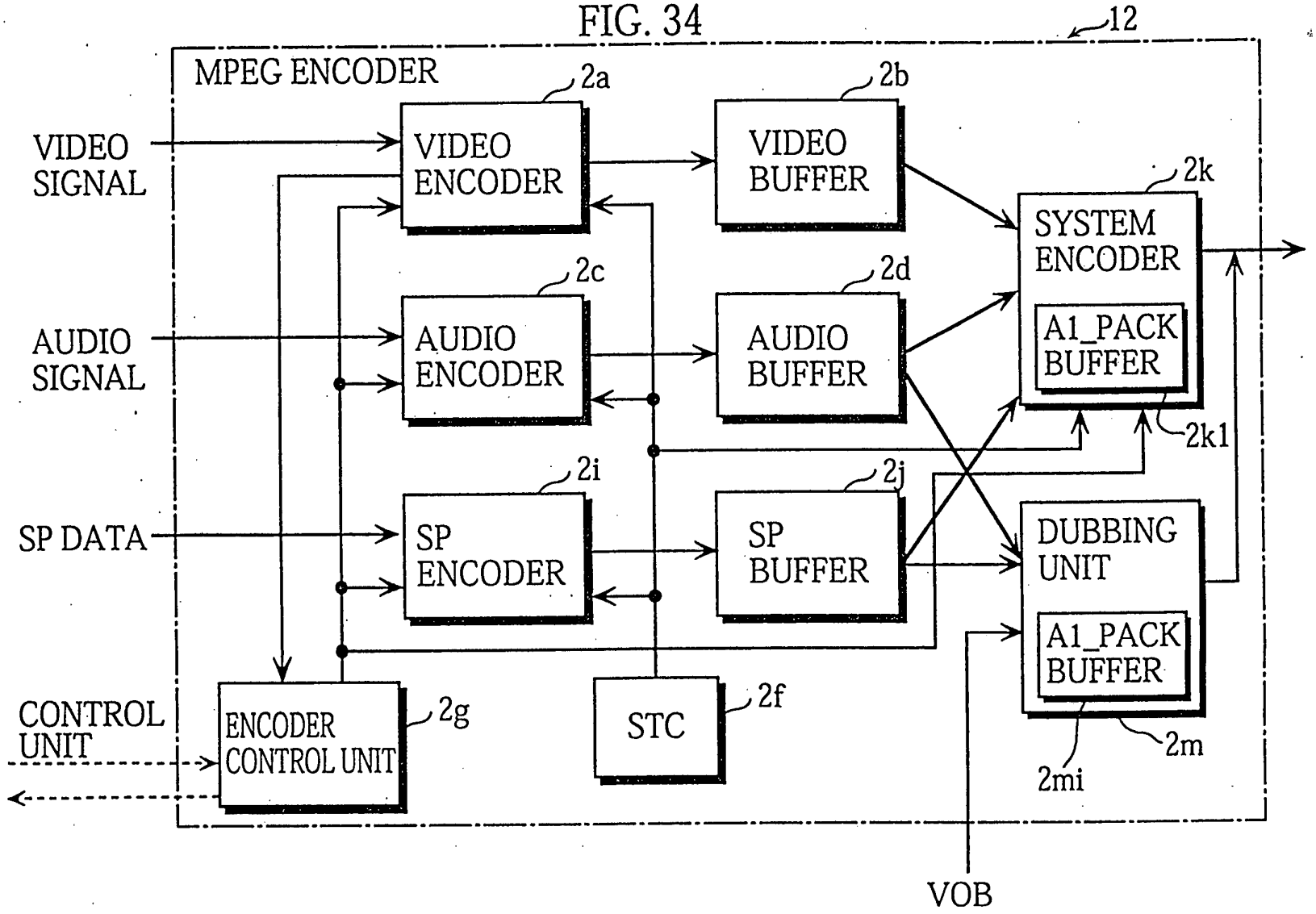

(FIRST LAYER)
(SECOND LAYER)
(THIRD LAYER)
(FOURTH LAYER)
(FIFTH LAYER)
AV DATA MANAGEMENT INFORMATION FILE
VOBI TABLE
PGCI TABLE
Number_ of_VOBs
VOBI#1
:
VOBI#N
AV_File_Name
VOB_ID
VOB_Start_Address
VOB_End_Address
VOB_Playback_Time
VOB_Attribute
=V_SA
=V_EA
Video_Attribute
Audio0_Attribute
Audio1_Attribute
SP_Attribute
Application_Flag

FIG. 34


12
MPEG ENCODER
2a
2b
VIDEO SIGNAL
VIDEO ENCODER
VIDEO BUFFER
2k
SYSTEM ENCODER
A1_PACK BUFFER
2c
2d
AUDIO SIGNAL
AUDIO ENCODER
AUDIO BUFFER
2k1
2i
2j
SP DATA
SP ENCODER
SP BUFFER
DUBBING UNIT
A1_PACK BUFFER
CONTROL UNIT
ENCODER CONTROL UNIT
2g
STC
2f
2m
2mi
VOB

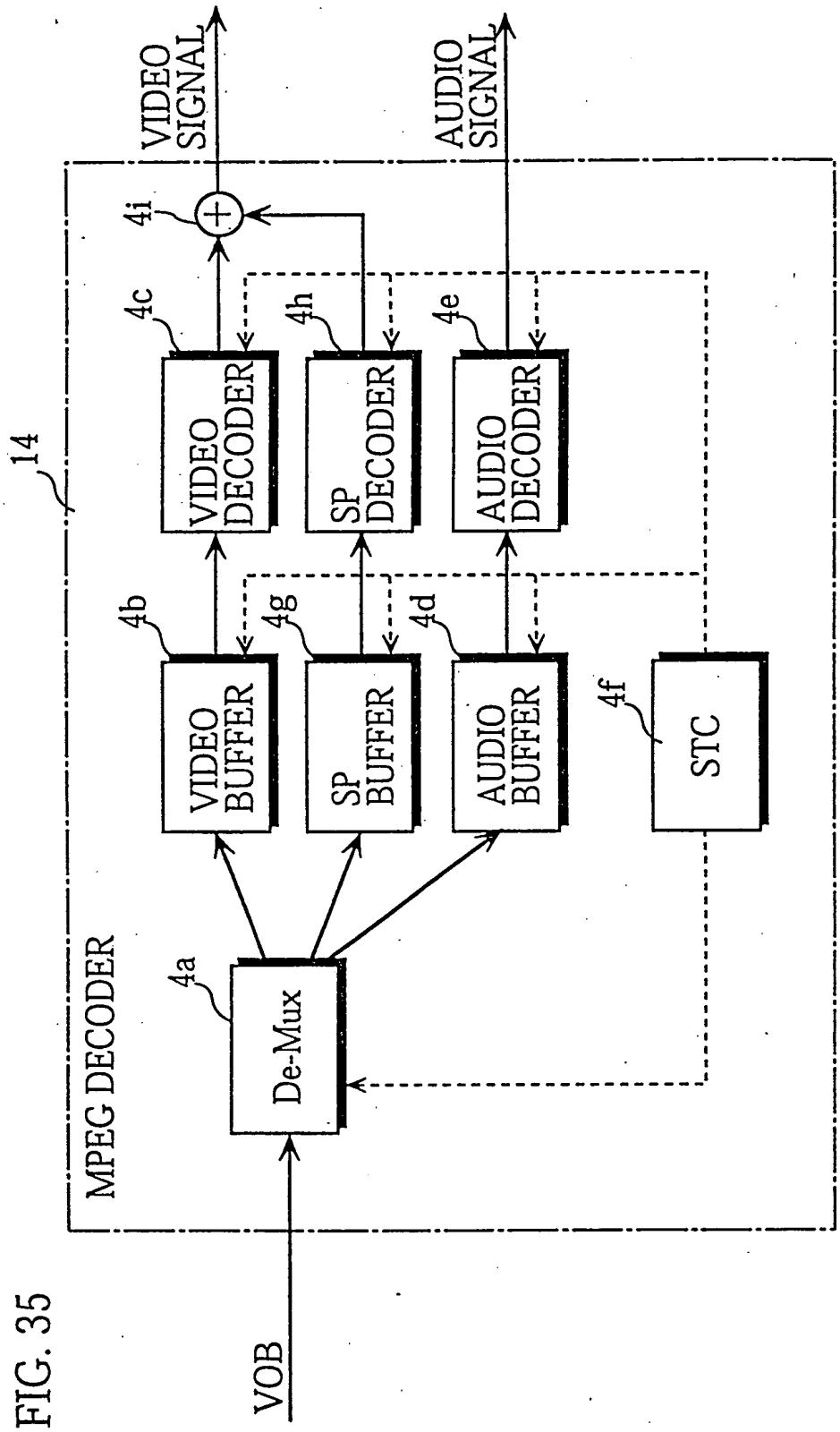

VOB
MPEG DECODER
14
De-Mux
4a
VIDEO BUFFER
4b
SP BUFFER
4g
AUDIO BUFFER
4d
STC
4f
VIDEO DECODER
4c
SP DECODER
4h
AUDIO DECODER
4e
4i
VIDEO SIGNAL
AUDIO SIGNAL

FIG. 35